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No. XIII. OF VOL. II., 1924. LONDON, SATURDAY, SEPTEMBER 27, 1924. Pp. 120—Price 1s.
No. 5274. Vol. CCVII. Founded 1823. Registered as a Newspaper. Published Weekly. Annual Subscription Inland £2 2s. Abroad £2 10s.


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# Some Principles
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# RADIO-THERAPEUTICS OF CANCER.

BY FRANCIS HERNAMAN-JOHNSON, M.D. ABERD.,

RADIOLOGIST TO THE FRENCH HOSPITAL, LONDON; MEDICAL OFFICER IN CHARGE, X RAY AND ELECTRICAL DEPARTMENT, CROYDON GENERAL HOSPITAL, ETC.

## I.

THE present would seem to be a suitable time to try to set forth some guiding principles for the radio-therapy of malignant disease. As often happens, it appeared much easier in earlier days to formulate such principles than is the case to-day. Ten years ago the simple faith of most of us, myself included, was that the secret of progress lay in finding means to irradiate a deep-seated tumour thoroughly without damage to the skin. For my own part, I always recognised that the tissues surrounding a growth played an important part in its cure, and that it was possible to stimulate them by X rays, while at the same time depressing the tumour cells. Nevertheless, I believed that the harder the ray the better for both purposes.

Let us consider this view and examine how far it will carry us.

The introduction into this country of X rays generated at 200–230,000 volts, filtered through 10 millimetres of aluminium or its equivalent, dates back to the year 1921; and at a discussion at the Royal Society of Medicine in March last (1924) we got a representative summary of the results. Disappointment was the keynote of most of the remarks. Many speakers frankly stated that the new methods were in their opinion no better than the old. I do not forget that the "new rays" were applied according to a new technique, and that it may be argued that this technique does not make the best use of them. But I have, myself, had an opportunity of comparing the results of rays generated at 160 kilo-volts with those from a 230 kilo-volt machine, the same technique being used in each case. I had been able to discover no difference in the results in pelvic cancer—the same temporary miracles being accomplished in both cases; and in breast cases it appeared to me that the longer wave-length had a rather better effect. A four-day dosage was adopted in both instances, and the filtration was the same. The skin dose was also equal, but the "depth dose," of course, reached a less intensity in the one case than in the other. Very similar results were reported from America in 1921 before European apparatus arrived there, a four-day dosage being used at 120 to 130 kilo-volts. It would be, of course, idle to deny that for pelvic growths a hard filtered ray is necessary, and there must be a limit below which efficiency falls rapidly. But, despite theoretical considerations regarding "percentage depth dose," it is doubtful if the very high voltages show any advantages in actual practice.

When we come to breast cancer, the Erlangen results are admitted to be disappointing, and curious attempts—which, to the writer's mind, savour of imitative magic—have been made to turn them artificially into deep-seated tumours by wax blocks—in order that the conditions present in uterine carcinoma may be reproduced! Now, it is a well-known fact that in former days excellent effects have been obtained in carcinoma mammæ by rays generated at about 100 to 120 kilo-volts with 2 millimetres of aluminium as a filter. Clinical evidence does not support the view that in breast cancer there are any advantages in very hard rays.

Sometimes one's faith in the whole principle of penetration receives a jar. Some years ago an old lady of 70 was sent to me suffering from a large ulcerating epithelioma of the thigh. She had had radium treatment, which at first did good, but finally seemed to make things worse. The friends were averse also to X rays, which, rightly, they regarded as closely akin to radium. More as a placebo than for any other reason, I decided to try rays from a tungsten arc. The thickened edge rapidly flattened out, and the whole ulcerated surface healed within a few weeks. There was already secondary mischief within the pelvis, and the patient died shortly afterwards—killed, her friends firmly believe to this day, by the unwise proceeding of closing her ulcer! This by the way. The point of interest is that the epitheliomatous tissue must have been at least a quarter of an inch in thickness, and therefore for the most part impenetrable to ultra-violet rays. Yet they caused it to disappear where radium had only produced irritaiton.

I made a statement in 1916, I think, to the effect that ultra-violet rays could not benefit exophthalmic goitre "because they had practically no penetration"; and one sees similar statements to-day. But I now cry peccavi. The only proof we can have that any therapeutic measure is of benefit is that in the first place improvement follows treatment in a large percentage of cases—a percentage high enough to exclude the possibility of what we call coincidence. This broad fact must first be established. Then suggestion must be excluded, and, so far as possible, extraneous physical factors. By the latter I mean, for example, fresh air, when one is estimating the benefits of natural sunlight, and change of scene and diet when considering the effects of mineral waters. When every care has been taken along such lines, we should never say that it is impossible that such and such measures should have effected a cure, because this appears to be incompatible with some *present* scientific belief. Over and over again clinical evidence has been discounted on such grounds, while later investigation has furnished a simple explanation. When chemical analysis had reached great exactitude certain mineral waters, which were said to lose some of their virtue when bottled, were examined, and it was found that their chemical composition remained constant for years; it was, therefore, declared impossible that their effects, if any, should differ from those produced at the actual spa. Later, it was shown these waters are at their source charged with radium emanation (*niton*); and this, of course, disintegrates within a few days.

At the present time one often sees it denied that certain very high dilutions of drugs can produce any physiological effect "because most of the doses would not contain a single molecule of the substance." But already some active substances are admitted to be potent in fractions so minute that only a few years ago the possibility of their producing any physiological effect would have been laughed at. The clinical test is alone of value. There is no difference between post hoc and propter hoc except a numerical one. All the above is somewhat of a digression, but it is vitally necessary in a subject such as radiology, in which the study of physical science is essential, that we should beware of denying clinical facts because of physical theories.

To return to our subject-matter, not only do we find ultra-violet rays successful in cases which have resisted those of shorter wave-length, but the converse is true. There are authenticated cases of burns caused by soft X rays, in which a cure has been effected by gamma rays, and even by hard filtered X rays. Such apparently paradoxical effects are possibly associated with the phenomena of "physiological interference" (Leonard Hill). The action of ultra-violet rays, for example, is modified if red light is at the same time caused to fall upon the skin area exposed.

We are now in a position to formulate two principles: (1) The wave-length most suitable for any given type of growth must be found by clinical observation, and cannot be deduced a priori from any physical considerations. (2) If an injury is inflicted

by rays of a given wave-length the lesion may in some cases be cured or mitigated by rays of a widely differing wave-length.

II.

We next come to the postulate that if only sufficient rays can be concentrated on to a malignant growth it will be killed; or, to put the belief in a milder form, that the best attainable results are always to be achieved by such a concentration. As regards pelvic growths, techniques of great ingenuity have been elaborated with a view to accomplishing this object. Multiple ports of entry have been long in use, but the rotating tube of Knox undoubtedly enables the idea to be carried out with the maximum of completeness. The theory itself is, however, open to serious criticism. In the first place, it has been proved beyond a doubt, and was admitted at the discussion above referred to, that even rodent ulcer cannot be killed with certainty by any dose of rays short of what is necessary to cause necrosis "en masse"—i.e., unless the rays are used frankly as a caustic. Owing to the impossibility of limiting effects in the depth, such use is, of course, not justifiable. On the other hand, small repeated doses are often quite successful in causing healing.

It will, I think, be generally admitted that a rodent ulcer does best when a fairly wide margin of apparently sound tissue is included in the irradiated area, and when a smart, but not too intense or prolonged, reaction is produced. That a therapeutic up-stirring of the surrounding tissues plays a large part in the cure of *any* cancer is a truth which is slowly gaining the recognition it deserves.

The laboratory observation that a cancerous tumour can be killed in vitro by radiation has limited the progress of clinical radiology. But this is not the fault of the experimenters. For they have also shown that the dose required to kill in vitro is vastly greater than that required to cause disappearances in vivo; also that previous irradiation of a proposed inoculation site reduces very greatly the likelihood of a "take." They have also proved that mild general raying increases resistance to cancer grafts, whereas heavy raying diminishes it.

The search for the cancer dose—the *therapia sterilizans magna*—reminds one of the attitude of many surgeons to the antiseptic dressing of wounds. The search for the ideal antiseptic has gone on for years, and every now and then its discovery is announced. But the results never come up to expectations. The reason is that in most cases antiseptic solutions act as stimulants to the wound rather than as direct killers of germs; and, therefore, are often of most use in solutions so weak as to be quite incapable of any direct lethal action on bacteria. When it was proved that ultra-violet rays could kill germs in vitro, the announcement caused great enthusiasm—an enthusiasm which was damped by the further discovery that this action was prevented by a layer of tissue having a thickness of only a fraction of a millimetre! Yet there is no doubt but that exposure to ultra-violet rays can cause the healing of wounds when the infection is of considerable depth. As Leonard Hill says, the healing is due to an indirect stimulation and is not the result of bactericidal action.

Embryonic cells are specially sensitive to X rays; malignant cells show certain embryonic characteristics; hence malignant cells in the body can be killed by a dose of X rays which will be harmless to normal cells. This imperfect syllogism is the basis of cancer-dose idea, and is analogous to the belief that infected wounds can be healed by an ideal antiseptic which will kill all the bacteria without injuring the body cells. There is, of course, an element of fact in both, but we should beware of being obsessed by one aspect of a truth. That X rays do exert a certain amount of direct action upon neoplastic cells is undoubted; but its amount is peculiarly incalculable, for a tumour should be regarded from a dynamic and not from a static aspect. By this I mean that clinical and microscopic similarity between two tumours at any given moment offers no proof, hardly even a presumption, that they will react in an identical manner to a given dose of radiation. For we know that X ray effect upon growing cells is determined in part upon their degree of activity at the time of application. We cannot gauge this factor when attempting to compare one tumour with another, and thus we can scarcely expect to be able to secure identical results in all patients by a standardised dosage. A malignant tumour is not the inert mass which it looks to the eye, nor are its cells truly represented by the set patterns seen in a "fixed and stained" microscopic preparation. Each cell in the tumour is alive: sometimes resting, sometimes plunging into an orgy of reproductive activity. Let us contemplate this picture with due humility, and beware of attempting prematurely to apply simple mathematical formulæ to complex and imperfectly understood biological processes.

It may be argued that although we can never hope to know beforehand the minimum dose for each tumour, yet a dosage can be administered which will always be the maximum ever required. But clinical experience has now shown that no dosage which it is practicable to administer can ensure that all cancer cells are killed.

This being the case, we have to think very carefully about the surrounding tissues. Cross-fire cannot be limited strictly to the tumour. We do not know its exact size and shape; and it is in the nature of things that the various beams must pass on, still powerful, into the tissues on that aspect of the tumour which is, for the time being, remote from the tube. In other words, it is impossible to concentrate upon the tumour—or, at any rate, upon its periphery, which is the part that matters most—a dose less than that which is received by the parts immediately surrounding it. On these much depends. Hence, for the crude idea of a purely destructive "cancer dose" should be substituted the following principle: *The amount of radiation which is concentrated upon a tumour should not exceed the maximum consistent with the production of a healthy reaction in the surrounding tissues.*

Assuming that, in a particular case, a concentrated dosage has been decided on, is the concentration in space to be paralleled by a similar concentration in time? In other words, is the maximum permissible dose (as clinically determined in accordance with the principle just laid down) to be delivered in one day or spread over several consecutive days? The former method is chiefly associated with the Erlangen school. It is admittedly hard on the patient, may in some cases be fatal; and, whatever the ultimate benefit, causes the appearance of a negative phase, during which the patient shows increased susceptibility to metastatic invasion. What are the arguments used by those in favour of the single dose?

1. They say that the dose required to cause sterilisation in the female has to be very considerably increased if the exposure is made over a period of some days.

This argument is beside the point, for two reasons. In the first place, the effect of X rays upon the reproductive cells is directly destructive. The action of the surrounding tissues does not come in at all. In the nature of the case it cannot, as the reproductive cells are normal to the body. But the cure of cancer by radiation is a subtle mingling of inhibition with stimulation. As we have seen, it is not possible to kill cancer cells by a mathematically calculated dosage, and there is no true analogy between X ray action upon the ovarian cells and upon those of a malignant tumour. In the second place, the mere fact that the dose required to produce a given effect is greater, in sum, when spread over a few days, has no bearing upon the merits of the case. *If the same effect can be produced in one of two ways, that which upsets the patient the least is obviously to be preferred.*

2. There is the argument that, with any division of the dose, there is a risk of actually stimulating the growth. To controvert this is, perhaps, already akin to flogging a dead horse; yet the idea still crops up

occasionally in unexpected quarters. The belief is based on theory alone—for the amount of so-called clinical evidence is so small that, were an equal amount brought forward to prove some benefit, it would be justly dismissed as coming well within the limits of coincidence.

That apparent stimulation of a growth may occur after too intense or too long-continued radiation is true; but this is due to a breakdown of resistance, and is not a true stimulation We find, in point of fact, that in the two malignant conditions most easily observed—namely, rodent ulcer and cancer of the breast—very small doses cause improvement or even apparent cure. If small quantities of radiation are really dangerous, then the upholders of the stimulation theory have proved too much; for no cases other than those in which the exact size, shape, and position of the growth are known should ever be treated. Otherwise, how shall we know what quantity of rays may reach some outlying spur or metastasis, exciting it to fatal activity? Thus, we see that this particular bogey carried to its logical conclusion ends in a reductio ad absurdum.

## III.

The method of concentrated cross-fire is applicable only in the case of tumours of moderate size, the position of which is believed to be known; and when it is assumed that there are no metastases. About the only instance in which these conditions are reasonably fulfilled is an early carcinoma of the uterus, more particularly of the cervix. Of such a nature are the cases on which the Erlangen claims to success are chiefly based; but in those which come into the hands of British radiologists the conditions are far otherwise. In the inoperable case, and in the post-operative recurrence, the disease is no longer limited in extent; consequently, only a wide distribution of radiation can be of avail. Not only so, but surgeons of the school of Mr. Sampson Handley are of opinion that *all* radiation treatment should be as widespread as possible, made to include the microscopically invisible lymphatic invasion, which they say spreads centrifugally from the primary tumour. Whether or not radiation treatment should *always* be widely distributed I do not feel competent to say: but it is, at least, certain that in 90 per cent. of the cases we see in England it is the only method by which we can hope to deal effectively with the disease.

This being admitted, we have to consider very carefully the question of *general effects*. A given exposure below the diaphragm causes more disturbance than the same dosage above; various ductless glands have also to be considered; but, other things being equal, the constitutional upset is proportional to the skin area exposed. This is a matter of clinical experience, and is to be correlated, at least in some degree, with the volume of blood which is irradiated.

In the case of widespread disease, it is impossible to dose the whole area with an intensity which might be safe enough if given over a more limited space. It may be desirable to include a large part of the abdomen, both from the back and from the front; and to give the unit skin dose of the Erlangen school in a single day upon such an area would in all likelihood be fatal to the patient. The area must be contracted, or the skin dose must be reduced, or the time must be greatly extended. From these alternatives there is no escape.

As a corollary to the maxim that concentrated dosage, if given, should not exceed that which is capable of producing healthy reaction in the tissues round a malignant growth, we need to add that *radiation treatment, given by whatsoever method, must be attuned to the estimated power of constitutional response in the individual patient.* A certain amount of disturbance, local or general, is not, of course, an indication of over-dosage, any more than is that which follows successful treatment by a vaccine. But just as the skilful vaccine-therapist seeks to avoid violent reactions in general, and, in the case of feeble patients, errs on the side of caution, so the wise radiologist will be chary of reactions in his stronger patients, and avoid them altogether in those of low vitality. That there is a close analogy between the action of X rays in microbial diseases and that of vaccines is undeniable. They seem to help the body to produce suitable antitoxins, irrespective of the particular organisms. The present tendency of bacteriologists to modify their views as to the specificity of vaccines makes this the more probable. Medicine is an organic whole, and it will pay the radiologist, although he cannot hope to master details, to follow the general trend of modern clinical bacteriology. The problems of immunity, the production of negative and positive phases, and, lastly, of anaphylaxis, can be neglected only at grave peril to the progress of radio-therapeutics.

This is perhaps a suitable place to refer to the effects of potassium in various forms. From time to time cases are published which seem to indicate that this element has some beneficial effect on malignant growths. This, at least, is certain: that in the case of pathological fibrous tissue, such as keloid, Dupuytren's contraction, &c., the exhibition of potassium may produce precisely the same effect as X ray exposures. Of this I can speak from personal observation. We find X rays producing in various cases results which may be obtained in other ways—e.g., by arsenic or thyroid in psoriasis; by vaccines in acne or tubercle; by potassium in keloid, and possibly in cancer. This chaos is, we may be sure, apparent only, but its existence is sufficient to show that the problems of radio-therapeutics cannot be divorced from those of medicine in general.

## IV.

So far we have been dealing for the most part with what may be classed under the general head of intensive therapy—i.e., treatment extending over not more than a few days, followed by an interval of at least several weeks. Such treatment is inevitably accompanied by at least some disturbance—which may, however, be very slight in people whose general health is still fair. But it is quite possible, and, indeed, was formerly the custom, to treat malignant cases without producing any apparent reaction. The small dose, repeated two or three times a week for perhaps two months, will cause shrinkage or disappearance of some cancerous tumours, notably of the breast. The general health improves pari passu, and this benefit is noticeable very early, sometimes after the first week.[1]

I have already referred to the experiments of Russ in this country, and of Murphy and Bainbridge in America, to the effect that a considerable degree of immunity to cancer grafts can be produced in rodents by suitable irradiation, whereas an excess lowers or abolishes resistance. The sense of well-being which accompanies suitable divided dosage in human beings, combined with the fact that nodules outside the area irradiated sometimes disappear, give ground for the belief that a similar phenomenon occurs in man. At any rate, the clinical results of this method are such that we are not justified in resorting to anything more drastic in the case of the old feeble, or when attempting to render an inoperable case operable. This statement requires some modification, in that, should mild measures fail, one ought to try others, even at some immediate risk. For prophylaxis the divided dosage should always be used.

## V.

Reference must now be made to what may be termed the constitutional side of the therapeutic problem. The broad fact is that patients in good general health respond the best, whereas those in a cachectic state sometimes fail to show even temporary benefit. Whatever is the nature of cancer, whether it is a germ disease or a biological "throw-back," we know the body unaided resists its progress—often

[1] When I speak of small doses I mean doses of the order of 2 m.a., 30 cm. antikathode—skin; 3 mm. aluminium filter; 140–160 kilo-volt; time, 10 min. The largest possible diaphragm is used, so a skin area at least 1 ft. in diameter is exposed.

for years, occasionally with permanent success. In cases which are rapidly going to the bad—in which, apparently, resistance is almost exhausted—we may sometimes by suitable X ray treatment produce a miraculous restoration to apparent health, which is usually only of a few months', but may be of some years' duration. Sooner or later, there is only too likely to occur a sudden and complete "going to pieces"—death occurring sometimes as the result of recurrence at the original site, but more often from widespread and rapidly growing metastases. The power of resistance seems to come to an abrupt end. A somewhat similar phenomenon sometimes occurs in tubercle. When this rapid collapse sets in, further X rays are, as a rule, useless; nor does experience so far lead us to hope that heavy dosage in the interval will avert such disasters.

It has been suggested that those malignant cells which are not killed in the first attack may acquire immunity to further dosage, and transmit this to their descendants. The question of inheritance of acquired immunity is a somewhat vexed one. It is perhaps simpler to assume that certain cells by reason of variation, or even of mutation, have inherently a higher resisting power; that these alone survive, and their descendants inherit the favourable character. It should also be noted that the immunity may be against the means of attack possessed by the body—which mechanism is stirred into activity by X ray treatment—rather than against any direct effects of the radiation. This is not merely a "distinction without a difference"—it has an obvious bearing on the lines which research should follow.

It has seemed desirable to mention this view of the tumour becoming immune to X rays; but, to the present writer, it appears more probable that death results from a failure of resisting power, local and general. If the tumour mass is reproduced from immune cells, one would expect trouble to begin very soon after the treatment, and to progress steadily—unless one assumes that the malignant cells lie paralysed for a long period, and then leap into furious activity. Even this somewhat far-fetched hypothesis will not suffice, unless we also assume that all the metastatic deposits are started after the latent period—an assumption very hard to reconcile with clinical facts.

Let us consider a typical case illustrating the measure of success, followed by final failure, which can be paralleled from the case-books of any experienced radiologist. A patient is seen, let us say, in January fast dying of pelvic cancer. She has a few days intensive treatment, and in two months she has put on 20 lb. in weight and returned to her ordinary occupation. Examination at the end of April reveals only slight traces of palpable disease.

It would appear that the patient is in a much more favourable condition for X ray treatment than when she first came. Yet, whatever is done in that way, she may be dead before the end of the year. Occasionally it is not so, and a second restoration may occur, or an interval treatment may appear to postpone the final collapse. Generally speaking, however, a repetition of the treatment gives disappointing results, and may even appear to do harm. In the latter case X ray anaphylaxis, which appears really to exist, may explain the failure—but this cannot account for all cases. Our patient, so desperately ill in January, yet had then some power of response which, unrecognisably better in April, she had nevertheless ceased to possess.

The failure of our efforts to take advantage of the "period of grace" in such cases to consolidate the ground won, and to use it as a basis for further advance is, perhaps, the greatest disappointment of modern medicine. Yet our experience with rodent ulcer, which extends over a quarter of a century, should have warned us of what to expect. Almost all rodent ulcers can be made to disappear once by X rays; sometimes twice. But such as recur once recur again, and are rarely amenable to a third course of treatment. They become "immune" or—as I prefer to put it—the surrounding tissues lose the power of response. It is my practice never to treat a recurring rodent ulcer again with X rays alone. But if the visible growth be destroyed by the curette, X rays will induce rapid healing of the wound. The mechanical stimulus of scraping, the flushing with fresh blood, &c., appears to restore the capacity of the tissues to react. The same result may sometimes be accomplished by first ionising with zinc or copper.

Recent work on vaccine therapy tends to show that in many cases injections act best if made within the tissues which are the actual seat of disease. For example, in the case of pyorrhœa, subcutaneous injections produce some benefit, but if the gum is chosen as the site, the effect is much more pronounced. It is assumed that the invaded tissue is capable of a special resistance over and above that offered by the body in general. Now, it would appear that the resistance to cancerous growth is also local and general. A rodent ulcer has no tendency to metastasis, and therefore, in treating it, we are chiefly concerned with local resistance. Breast and uterine cancers call for an opposition both local and general.

In the case of deep-seated tumours, attempts at local "resensitisation" must at present be empirical. They are limited to the passing of diathermic currents or heavy continuous currents through the site of the growth, and the injection of colloidal metals in such a manner that they reach the general circulation. Blair Bell's experiments with lead should be kept in view in this connexion.

In the matter of raising the general resistance, we are on somewhat firmer ground. There are certain experimental and clinical hints on which we may act. Rats fed on a vitamin-excess diet are very resistant to cancer grafts; let us give our patients a suitable diet. Again, patients whose blood is normal in every respect respond well to X rays. Sunlight increases the red cells and the hæmoglobin index. See that patients have it—natural, if possible; it not, then synthetic. The "open-air cure" is as important in cancer as in tubercle, but the exposure of delicate patients to the outdoor conditions of an English winter is not to be recommended, unless artificial sunlight is supplied when there is none from above.

Closely associated with the question of general resistance is the mental attitude of patients. There can be little doubt but that some of them literally worry themselves into their graves. In this connexion it is interesting to recall the history of tuberculosis of the lungs. Twenty years ago there was almost the same reluctance to tell a patient he was suffering from "consumption" as now to inform him that he has cancer. The public dread of the disease is now much less, and it is possible to deal with most lung patients as rational beings. From a long experience, I cannot help feeling that well-meant attempts to conceal from a patient that he has cancer are often only partially successful. With men, it is, as a rule, scarcely worth while to make the attempt; and it becomes increasingly difficult to conceal the truth from women, while at the same time taking those measures which offer the best scope of recovery. A brutal announcement of "cancer" at the first consultation often does irreparable harm; but the patient can be accustomed gradually to the idea without the word being actually mentioned. Only thus can we secure the full coöperation of the patient, who cannot otherwise understand why she should be medically watched after her "lump" has disappeared. Attempts at such watching and prophylaxis, without full explanation, often lead to suspicion and even resentment. Some of my most cheerful patients are women who are quite aware of what is the matter with them, and upon whom no greater deception has been practised than the representation to them that their individual cases are an especially favourable type of a grave disease. I am, in short, in favour of greater frankness; while quite recognising that there are people, who, if convinced that they had cancer, would forthwith turn their faces to the wall and die.

## VI.

I do not think we should close a discussion of principles without saying something about those which should govern the formulation of theories. Theories are good servants, bad masters. I warn the young radiologist against facile "explanations." It is, perhaps, a truism to say that there is no such thing as an ultimate explanation of any natural phenomenon; but it is possible to make suppositions which lead to a fuller control of natural forces. This is the sole test of the value of any hypothesis. To suggest that a malignant tumour fails to respond to a second or third course of X rays because the growth and its surroundings have lost the power of response—that they require to be resensitised—is a legitimate use of hypothesis, because it calls for experimental proof or disproof. And whether the results be positive or negative, fresh knowledge will almost certainly be gained. An unverified hypothesis masquerading as a theory may, however, be a millstone round the neck. Years ago someone observed, correctly enough, that X rays promoted the formation of fibrous tissue in breast cancer. This started a legend to the effect that X rays *always* produce fibrous tissue. X rays will, in fact, cause the disappearance of a keloid and of pathological fibrous tissue in general. They promote natural healing processes, inducing fibrous tissue formation where this is essential to cure; banishing it where its presence is abnormal. Yet even now there are many surgeons who believe the extraordinary untruth to which I have referred.

The deadly danger of cocksure theorising lies in this: that a mode of treatment is often unjustly condemned solely because a theory prominently associated with it is proven false or inadequate. At the present moment medical diathermy is in considerable danger of such a fate, owing to the claim of some of its advocates that it acts solely through its heat-producing effects. Astute critics very rightly refuse to credit heat, however applied, with the powers claimed for the diathermic currents, and therefore dispute the alleged benefits.

In attempts to convert the heathen who are without the fold, stress should be laid upon clinical results and theories kept in the background. To do otherwise is to put the cart before the horse. Let us formulate no hypothesis except such as can be put to some sort of experimental test in vivo; and let us discuss even these only amongst ourselves. Our non-radiological colleagues often demand "explanations" for the results we claim. The temptation to oblige should be resisted, for a lightly given opinion may later on, in a medical or surgical text-book, rise up to condemn us.

## VII.

It remains only to set forth in summary form certain conclusions. Some of these are of the nature of fundamental principles; others are statements of personal views; but all are based upon what actually happens in the living subject, and not upon what, in the opinion of those who rely upon physical considerations, *ought* to happen.

1. The wave-length most suitable for any given type of growth can be found only by clinical observation.

2. If an injury is inflicted by rays of a given wave-length, the lesion may be cured or mitigated by rays of a widely different wave-length.

3. We should regard malignant tumours from a dynamic and not from a static viewpoint. The microscope does not enable us to say that any two tumours are really alike.

4. The still healthy parts in the neighbourhood of a tumour play a vital part in the success of any therapeutic measure.

5. When "intensive dosage" is used, the amount of radiation which is concentrated upon a tumour should not exceed the maximum consistent with the production of a healthy reaction in the surrounding tissues.

6. The so-called danger of a "stimulating dose" is a bogey. If the danger were real it would forbid the treatment by X rays of any but the earliest growths.

7. The intensive method should rarely be used to render a case operable, and never as a prophylactic after operation. For this purpose, and as a palliative in hopeless cases, the small divided dose is alone suitable.

8. The radio-therapeutics of cancer cannot be studied as a subject unto itself. Nature does not work in watertight compartments. Often she brings about the same result by dissimilar means; and where a single measure fails, a combination may succeed. This is not "blunderbuss therapy," which consists in firing at the patient a number of drugs of doubtful reputation in the vain hope that in some instance rumour may have spoken true. It is the employment at the same time of two or more therapeutic methods, each of which has been separately proved to be of definite value. This principle is applicable to local procedures, but finds its greatest field of usefulness in constitutional treatment.

# HEREDITARY AND FAMILIAL NEPHRITIS.

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HERRICK states: "There can be no question that the tendency to nephritis is at times transmitted. This is often a hereditary arterio-sclerotic tendency, the kidney sharing in the general vascular change. The chronic forms may appear even in childhood."[1] He relates the family history of a woman, aged 50, who suffered from chronic interstitial nephritis. The parents and several uncles and aunts had renal trouble. Her three daughters and one son had albuminuria from the age of 20, and cardio-vascular changes were already present. In some families the tendency to early arterial degeneration, apparently hereditarily transmitted, is seen with early cerebral hæmorrhages—in others, with myocarditis or pectoral angina—or, again, with contracted kidneys. Sometimes one member of the family exhibits one manifestation of the disease—e.g., the myocardial—while another has cerebral hæmorrhage, and another has chronic nephritis. Not infrequently in one and the same individual there may be manifested not alone the nephritic, but the myocardial or cerebral evidence of arterio-sclerosis.

It is generally accepted that arterio-sclerosis is frequently found in young persons in whom congenital syphilis can be proved.[2]

### DIGEST OF THE LITERATURE.

From a survey of the literature it appears that heredity as an ætiological factor in nephritis has, with few exceptions, neither interested nor impressed clinicians or pathologists. Some few, however, have investigated aspects of the subject.

Records of a family have been very carefully and fully studied by Hurst.[3] In this family there are 27 persons in three generations, and of these 16 suffered from nephritis. (See Tree A.)

*First Generation.*—In the first generation two persons died at an early age—the cause of death is unknown, but it is known that they suffered from albuminuria and hæmaturia. The third member of the family, one of the mothers of the second generation, suffered from attacks of hæmaturia—these could be brought on by eating black currants or

drinking claret. There is no history of nephritis in the other five members of that generation. The children of Case 3 all seem to have suffered from the same condition as the mother—intermittent attacks of hæmaturia which could be brought on by eating certain substances, usually black currants. The attacks in these members of the family seem to have been more of the nature of a pure hæmaturia than a parenchymatous nephritis. Though they were associated with malaise and some fever, tube casts, other than blood casts, did not appear in the urine; there is no history of œdema or of cardio-vascular disturbance. Case 8 was more severe than the others, and pericarditis, presumed to be of a nephritic origin, was a terminal complication.

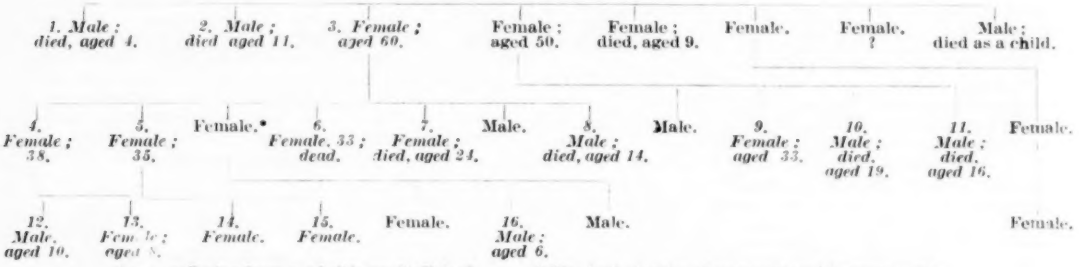
Leonard G. Guthrie made a study of this part of the family[4] and describes the condition as "idiopathic or congenital hereditary and family hæmaturia" in the following terms:—That it is: (1) Hereditary—familial and congenital; (2) persistent for many years, but may vary in extent; (3) liable to paroxysmal exacerbations with influenzal-like symptoms; (4) not marked by œdema, ascites, or cardio-vascular disturbance; (5) not due to uric acid or oxalates; (6) not accompanied by urine of low specific gravity (1015–1020). From these facts Guthrie omits the word "nephritis" and favours "hæmaturia" in describing the condition.

*Second Generation.*—The second part of the second generation, described by Hurst, consisting of three males and one female, were descended from a mother who had not suffered from any renal derangement, but two of the males and the female member were affected with what appears to be a definite nephritis and very little hæmaturia. The one female (Case 9) is well, but has had albuminuria since 3 weeks of age. Two brothers, however, showed severe symptoms. One (Case 10) was found to have albumin in the urine at the age of 14, after which the albuminuria persisted, together with attacks of hæmaturia after exertion, to terminate in death from uræmia at the age of 19, after an attack of influenza. The other brother (Case 11) was found to suffer from albuminuria when 2 years of age, persisting till his death at the age of 16 years. When he was 12 years old there was no œdema, but the blood pressure measured 143 mm. of mercury. The urine at this time was albuminous, contained numerous blood cells, and granular and hyaline casts. When seen two years later he was pale and anæmic, had had several attacks of sickness, the blood was 137 mm. Hg and the heart considerably hypertrophied. His urine contained, in addition to the albumin, casts of a coarsely granular and fatty-epithelial nature. The specific gravity was 1010. Shortly after this he became uræmic, with anuria, and showed some puffiness of the face. He recovered from this, but died in his sleep shortly after. The symptoms of this part of the family show definite nephritis, mainly of the interstitial type. Œdema and cardio-vascular disturbance are marked features, while the specific gravity of the urine was less than 1015. Guthrie's description—family hæmaturia—given to Cases 3, 6, 7, and 8 is, therefore, not applicable in Cases 9, 10, and 11.

Hurst has made further investigations upon this interesting family, and has been good enough to permit us to give recent data which supplement what he has already published. The new facts concerning this branch of the family are that a daughter of the fifth member of the first generation, a mother free from kidney disease, is herself free and has a daughter in the third generation also entirely free—thus, this branch of the family seems to have escaped the trouble affecting the rest of the family.

*Third Generation.*—In his communication Hurst mentioned only Case 12 of the third generation, but children have since been born, four of whom are affected with kidney disease.

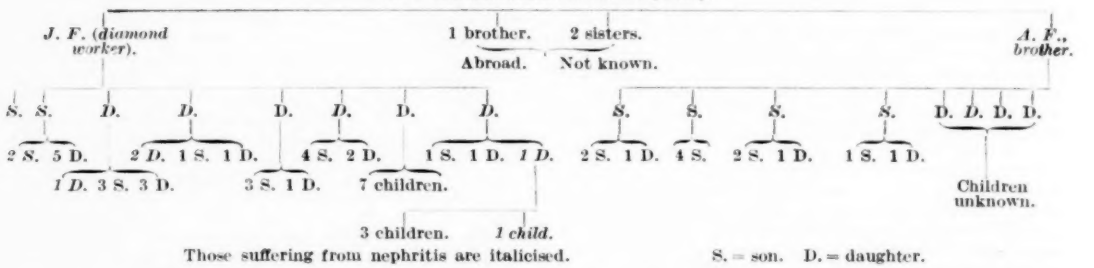
A.—GENEALOGICAL TREE (HURST).




Cases suffering from nephritis are italicised. * Has had attacks of epistaxis and hæmatemesis.

Case 12, a male child of Case 4, a female who is "subject to attacks of hæmaturia," but apparently not of a serious nature. The child, at present 10 years of age, had an attack of hæmaturia in infancy, and later a sore-throat and temperature of 102° F. After this he suffered for six weeks from albuminuria, together with hyaline, epithelial, and granular casts. This condition has cleared up to some extent, but has left an apparently high blood pressure. This child has a sister of 8 years (Case 13), who is affected, but of whom there are no details. Case 5, a female who does not suffer severely, has two female children who are affected (Cases 14 and 15). The third daughter of Case 3, sister of Cases 4, 5, 6, 7, and 8, who suffers from epistaxis and hæmatemesis but not from hæmaturia, has a daughter and two sons, one son being affected—in this case the condition has missed a generation.

B.—GENEALOGICAL TREE (PEL).


J. F. (diamond worker).
1 brother. Abroad.
2 sisters. Not known.
A. F., brother.
S. S. 2 S. 5 D.
D. 1 D. 3 S. 3 D.
D. 2 D. 1 S. 1 D.
D. 3 S. 1 D.
D. 4 S. 2 D.
D. 7 children.
D. 1 S. 1 D. 1 D.
D. 3 children. 1 child.
S. 2 S. 1 D.
S. 4 S.
S. 2 S. 1 D.
S. 1 S. 1 D.
D. D. D. D. Children unknown.

Those suffering from nephritis are italicised. S. = son. D. = daughter.

In naming the condition, Hurst has employed the terms "hereditary, familial, congenital, hæmorrhagic nephritis." The condition fulfils all these descriptions. After a broader survey of the family than Guthrie's, Hurst prefers the term "nephritis," as being more accurate than "hæmaturia." Throughout the family the males seem to be affected very much more than the females, all the affected male members having succumbed except the two children of the third generation. The females, on the other hand, seem to be affected only to a slight extent, slight albuminuria, together with hæmaturia in the majority of cases, and then only under certain conditions. It would be interesting to note later if the condition was carried down by the male members as it has been by the females.

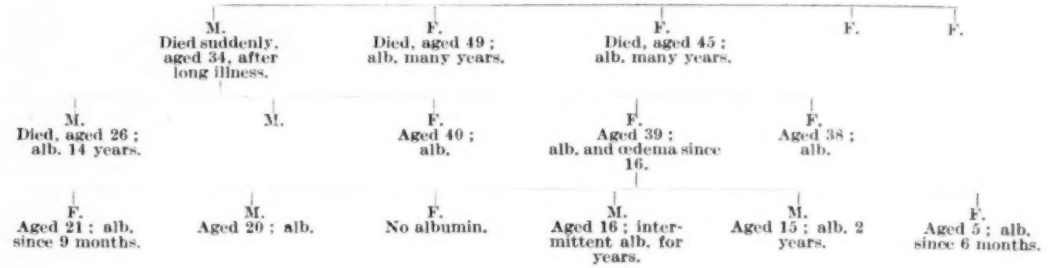
A family has been very fully investigated by Pel.[5] Three generations are given fully and a fourth mentioned—in all, there are 19 cases of nephritis. The main familial points in the tree are shown in Tree B—fuller detail may be found in the original article.

The cases appear to have been of a chronic interstitial type, and several are stated to have died in uræmia. Throughout this family, the males and females appear to be affected equally. In the third generation the disease seems to be lessening, though one member has a child in a fourth

generation, a sufferer from nephritis. In the family of J. F., with one exception, all the children who suffered from nephritis passed it on to members of the next generation. The exception is the fourth daughter, who has six children free from the disease. The non-sufferers produced non-suffering families. In the family of A. F. no evidence of nephritis has thus far been obtained in the 12 grandchildren that have been traced—the disease not having been passed on either by sufferers or non-sufferers.

A family is quoted by Dickinson,[6] in which three generations are studied. According to this author, "The disease (nephritis) cleaves less to race than tubercle, cancer, stone, . . . but yet the family proclivity declares itself unmistakably." (See Tree C.)

C.—GENEALOGICAL TREE (DICKINSON).


M. Died suddenly, aged 34, after long illness.
F. Died, aged 49; alb. many years.
F. Died, aged 45; alb. many years.
F.
F.
M. Died, aged 26; alb. 14 years.
M.
F. Aged 40; alb.
F. Aged 39; alb. and œdema since 16.
F. Aged 38; alb.
F. Aged 21; alb. since 9 months.
M. Aged 20; alb.
F. No albumin.
M. Aged 16; intermittent alb. for years.
M. Aged 15; alb. 2 years.
F. Aged 5; alb. since 6 months.

alb. = albuminuria.

This family has been noted for a "complexion of clear and transparent colour, since the Wars of the Roses," similar to that of members at present suffering from albuminuria; from this Dickinson supposes that the condition may have been present for many generations. Here no detail is given, but the severity of the cases seems less than in Hurst's cases. It is carried down by one male and one female, and appears to attack males and females alike.

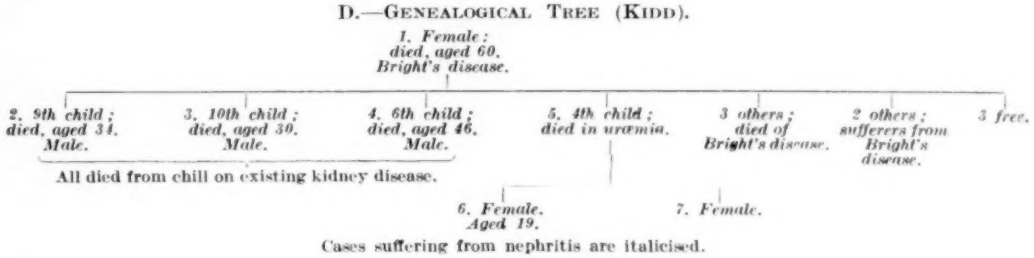
Newberry Fergusson describes a case examined by him,[7] of a man with albuminuria but without symptoms. On making a routine examination he found albumin in the urine of every member of the family, although none were previously aware of this nor presented symptoms.

A family in which nephritis is definitely shown in three generations is described[8] by Joseph Kidd.[8] A few of the cases are described, and from these Tree D has been constructed.

There were four cases in the children of this family also. The first child, aged 1 year, suddenly developed acute nephritis with general anasarca, and died within a month. A second child became ill in the following year and died of chronic parenchymatous nephritis two years later. At this time a third child became ill and died in a year, when a fourth child, 13 months old, developed nephritis. There was no history of scarlet fever or diphtheria in any of the cases, neither was there a history of nephritis in the family.

From this digest of the literature, it appears that a special family incidence of nephritis has been recorded on notably few occasions in the course of many years. The infrequent contributions to the literature and the scant reference to the subject in the text-books may have several explanations. It may be that the family incidence of nephritis is rare, and this is the logical inference from the foregoing digest. Secondly, this incidence may have been overlooked to an extent that would appreciably detract from the value of the literature as a mirror of what actually occurs. To an uncertain extent this will be true. If effective attention is called to any subject it is remarkable how rapidly instances are discovered that would otherwise escape observation. Lastly, the family incidence of nephritis may already have been adequately recognised and the various aspects of the subject adequately studied. In the opinion of the writers, this is not the explanation of the dearth of literature on the subject.

D.—GENEALOGICAL TREE (KIDD).


1. Female: died, aged 60. Bright's disease.
2. 9th child; died, aged 34. Male.
3. 10th child; died, aged 30. Male.
4. 6th child; died, aged 46. Male.
5. 4th child; died in uræmia.
3 others; died of Bright's disease.
2 others; sufferers from Bright's disease.
3 free.
All died from chill on existing kidney disease.
6. Female. Aged 19.
7. Female.

Cases suffering from nephritis are italicised.

Kidd points out that of the second generation seven died of kidney disease, and that two others are sufferers from this complaint. The two children noted in the third generation are also nephritics. As far as can be judged from the details, the males are more severely affected than the females, and the condition appears to be handed down by the females.

Meigs[9] mentions a family in which two generations were affected by renal disease, which appears to have been handed down by a male. The father, after an attack of hepatic colic, was found to have albuminuria and died 18 months afterwards, in uræmia. One son and two daughters had died of renal disease previous to this, while a third daughter, 31 years of age, was suffering from albuminuria and nearly succumbed to a nephritic attack.

Familial intrinsic weakness on the part of the kidney, thus presenting a "locus minoris resistentiæ" to infection is considered by Thomson and Macauley[10] as a possible factor in four cases of nephritis occurring as a sequel to influenza in the children of one family.

The intrinsic weakness seems even more certain in the cases described by Benson,[11] as no extrinsic cause was discovered.

### CASES OBSERVED BY THE AUTHORS.

In recent months we have had under observation a series of cases in which the question of family incidence took up our attention. The less interesting may have been accidental happenings. Two examples of this may be mentioned, as follows:—

Two brothers were admitted to the ward suffering from acute nephritis. They were admitted on different days, but were there during the same period. A man was admitted for a recurrence of nephritis, and his son was admitted for acute nephritis. A daughter was examined as an out-patient and found to have albuminuria.

Much more interesting, because clearly no accidental occurrence, was the history given by N. McL., aged 48, a nurse. She was admitted suffering from a slight bronchitis, which was mild but sufficient to unfit her for work for ten days. The family history of this patient was as follows

The father died of apoplexy at the age of 75, the mother died of apoplexy at the age of 68. An uncle, brother of the mother, died of apoplexy at the age of 60. A sister had acute nephritis with terminal apoplexy at the age of 51, and a brother died of chronic Bright's disease at the age of 46. Our patient had nothing abnormal in her general appearance except dilated turgid capillaries about the end of the nose. She was found to be suffering from chronic interstitial nephritis, marked arterio-sclerosis, and hyperpiesia with cardiac hypertrophy. The systolic blood pressure was 230 mm. Hg. On most days there was a trace of albumin in the urine. The specific gravity varied from 1012–1022. Reaction acid. Oxalate crystals, epithelial and red blood cells were present in the urine on admission. The amount of urine was never more than 50 oz. daily and was usually much less. The blood-urea was not increased.

The renal function tests made were as follows:—9 A.M.: 210 c.cm., 0·8 urea, 22 phenol-sulphon-phthalein (P.S.P.); 10 A.M.: 100 c.cm., 1·7 urea, 17 P.S.P. The Wassermann test was negative.

A family, composed of the father and mother, three sons and two daughters, has also recently come under our observation. Three sons and one daughter were found to be suffering from definite symptoms of renal involvement, and were admitted to hospital under our charge. The other daughter was compelled to give up attendance at school before the statutory leaving age, owing to the state of her heart and general health. There is also in this case evidence of a kidney defect.

We endeavoured to elucidate the relative significance of hereditary and acquired ætiological factors in these cases.

### *Question of Hereditary Factors.*

*Nephritis in the Antecedents.*—An uncle died in the R.I.E. in 1920, from nephritis, but we have been unable to trace the record. An uncle is at present suffering from chronic nephritis. On examination of the father's urine, on one occasion only, no albumin, cells, or tube casts were present. The mother was apparently healthy.

*Syphilis.*—We examined the family to ascertain whether syphilis might have been a causal factor in the production of arterio-sclerosis. None of the stigmata of syphilis were present in any member of the family, and in the blood of the three sons the Wassermann test gave negative results. The blood of the daughter who presented symptoms of renal involvement was not submitted to the test. The family seems, however, to be free from all syphilitic taint.

### *Question of Acquired Factors.*

The discovery of nephritis in four young members of one family, more or less about the same time, suggests some common acquired causal factor. It is improbable that each of the cases had a different cause. The facts relative to these matters are given in the records of the individual cases.

Although these cases of nephritis were diagnosed within a few weeks of each other, we are quite unable to say, even approximately, the dates of origin. The symptoms observed were, in fact, interpreted as exacerbations of previously existing kidney disorder, but showing no manifestations of the condition, as no previous history was obtained in any of the four patients studied.

### *Surroundings at Home and at Work.*

The family lives in a house consisting of a room, kitchen, scullery, and lavatory. Living in this are nine persons: Father and mother, three sons (aged 20, 19, and 18), two daughters (aged 14 and 10), two lodgers (men). The house is situated in a street. The water-supply is derived from a distant reservoir and is laid on to all the houses separately in pipes (not a common pipe outside). Food is supplied by local tradesmen, and in no way differs from that supplied to other inhabitants of the street. All the male members of the family are coalminers. Work at the mine is in two shafts, the west and the south. The former contains a foot deep of water, but the temperature is moderate. The latter is dry but extremely hot, causing those working in it to become soaked in perspiration. The work of the boys is that of "drawer," and consists in hauling "hutches" back from the coal face. At the end of the trip in the south working they have to wait and are apt to get chilled after the heat. This south shaft has a bad reputation amongst miners, but on account of the heat they have to work in and not on account of any illness, other than chill, contracted while working there. Food and a bottle of water are carried by the workers. No water is obtainable at the pit for drinking, and tea cannot be made there. Symptoms pointing to renal disorder, such as are complained of by the boys, are evidently uncommon, and have not been noticed by them, or their mother, either at the mine or in the district.

### *Records of the Cases.*

*David S.*, aged 18, coalminer. Was admitted on May 16th, 1922, complaining of swelling of the face and pain in the head. The history was that five days before admission he caught a chill, playing football. It was learned, on further inquiry, that there had been some swelling of the face two months before the onset of the illness for which he was admitted. In infancy he had measles, and during childhood the tonsils were removed. He does not appear to have had any other illnesses. On examination his face was swollen and puffy, but not very œdematous. His complexion was pasty. He had no marked anæmia. Examination of the urinary system showed the presence of albumin, blood, and casts—albumin about 10 g. per litre. The casts were chiefly composed of broken-down epithelium and blood cells. Streptococci were isolated from the urine on three occasions. (No subjective symptoms were complained of.) The non-protein nitrogen of the blood was 42 mg. per 100 c.cm. The urea concentration in the second hour was 1·7 per cent. The P.S.P. excretion was high—95 per cent. being returned in two hours.

Renal efficiency tests, June 28th, 1922:—First hour: 270 c.cm., 1·1 per cent. urea, 60 per cent. P.S.P.; second hour: 113 c.cm., 1·7 per cent. urea, 35 per cent. P.S.P.

The heart was somewhat enlarged, the apex being 4¼ inches from the middle line. Diffuse pulsation was seen in the fourth and fifth intercostal spaces, and the movement was heaving in character. The heart sounds were closed. The radial artery was definitely palpable, and the systolic blood pressure (taken on May 21st) was 172 mm. Hg. Blood culture yielded a growth of streptococci on one occasion. Ten teeth were present in each jaw. These were carious and in a septic condition. The breath was rather foul. There was no congestion of the fauces. A mixed growth of organisms was obtained from the teeth and tonsillar region, with streptococci preponderating. The Wassermann reaction was negative.

The patient was first put on a salt-free diet, and later on light diet. Daily hot-air baths were given. The further course was that the œdema gradually disappeared; the albuminuria was somewhat obstinate, ranging during the first eight days from 6 to 15 g. per litre, dropping gradually to 1 g. per litre, and remaining at this. Hæmaturia occurred on ten occasions, and ceased shortly before his discharge from hospital in the early part of August. Blood, epithelial cells, and granular casts were noted once. When we saw him again by request, four months after his discharge from hospital (seven months after admission), a mere opalescence appeared on heating the urine, and streptococci were obtained in cultures. The S.B.P. was 126, and the apex beat of the heart was 3¼ inches from the mid-line. He had been at work since his discharge and had felt entirely well.

*John S.*, aged 20, coalminer, was admitted to hospital on June 6th, 1922. Complaint: Swelling of face; pain in back; headache, which had been present four days. He had worked in both the wet and the hot shafts—in the latter he worked stripped to the waist, and he had only worked nine days there when he was taken ill. He consulted his doctor, who sent him to hospital. The only previous illness of any importance was osteomyelitis ten years previously, when part of the right tibia was removed. He had not required medical attendance in recent years. He had not had scarlet fever. There was no history of previous attacks of nephritis. On examination, his face was puffy around the eyes but not very œdematous.

Examination of the urinary system: No subjective symptoms were complained of. The urine was passed in good quantities (1136–1845 c.cm. per diem). Traces of blood were present, and albumin to the extent of 4 g. per litre. Granular and hyaline casts were present, but no organisms, pus, or epithelial cells were found in a stained film. No growth was obtained on culture. The non-protein nitrogen of the blood was 36 mg. per 100 c.cm. The urea concentration in the second hour was 2·3 per cent.

The P.S.P. excretion was not good, 50 per cent. being returned in two hours. First hour: 183 c.cm., 1·4 per cent. urea, 35 per cent. P.S.P.; second hour: 106 c.cm., 2·3 per cent. urea, 15 per cent. P.S.P. A blood count showed some leucocytosis.

The apex of the heart was 3¾ in. from the mid-line. There was a slight systolic murmur at the mitral area, but no accentuation of the second sound. No subjective symptoms were complained of. The wall of the radial artery was definitely palpable. The arterial wave was slow in upstroke and downstroke and well sustained, the vessel was not easily compressed. The systolic blood pressure was 148 mg. Hg. No growth was obtained from blood cultures on two occasions. The fundus oculi showed no changes. Six teeth were in bad condition, but there was no pyorrhœa alveolaris. The tongue was slightly furred; the fauces healthy. The Wassermann reaction was negative.

The patient responded to treatment more quickly than in the last case, the blood disappearing from the urine and the albumin diminishing to a trace. Four months after leaving hospital the urine was completely free of albumin, the S.B.P. was 142 mm. Hg (the arteries were very definitely palpable), oedema was absent, and no subjective symptoms were complained of. Stained films of the urine were bacteriologically negative.

*Joseph S.*, aged 19, coalminer, was admitted to hospital on June 26th, 1922, as we wished to examine as many members of the family as were willing to present themselves. He had been unemployed for a fortnight previous to admission, but had felt fit and well. Before this he had worked in both shafts. Complaint: Swelling of the face, commencing one week before admission, but of no other symptoms. On examination, patient showed some puffiness under the eyes, but he did not feel ill in any way. The swelling had been present for one week. He could remember no illness, even during childhood. Examination of the urinary system showed slight frequency of micturition—he had to rise once during the night. The quantity per diem was 994–1278 c.cm. The urine itself showed a trace of blood, and albumin to the extent of 1 to 3 g. per litre. Hyaline casts, red blood corpuscles, and epithelial cells were found in the deposit. Cultural examination was negative.

On July 10th the non-protein nitrogen of the blood was 38 mg. per 100 c.cm. Urea concentration in the second hour was 2·6 per cent. P.S.P. elimination good, at 80 per cent. in two hours. First hour: 73 c.cm., 2·3 per cent. urea, 45 per cent. P.S.P.; second hour: 82 c.cm., 2·6 per cent. urea, 35 per cent. P.S.P.

Examination of the circulatory system revealed no subjective symptoms. The heart was somewhat enlarged, the apex being 4¼ in. from the mid-line—it was forcible in character, though not increased in extent. The wall of the radial artery was definitely palpable. Systolic blood pressure was 172 mm. Hg. No growth was obtained from blood cultures. Teeth were in fair condition and gums healthy. Tonsils not enlarged. Wassermann reaction of the blood negative. In cultures from teeth and tonsils streptococcal colonies were numerous.

Patient responded well to treatment, and showed a decrease of blood pressure to 143 mm. Hg and the albumin and blood in the urine diminished to a trace. A few well-formed granular casts were present on one occasion. On examination four months after leaving hospital there was only a faint trace of albumin in the urine, the heart had diminished in size, the apex being 3¼ in. from the mid-line, the first sound was dull and the second slightly accentuated, the S.B.P. was 139, and the arterial wall palpable.

*Alice S.*, aged 10. It was heard that this girl was suffering from some urinary trouble, and she was sent for and admitted to hospital. It appeared that six months previously she had some pain in the right iliac fossa, and she was then seen in the Royal Hospital for Sick Children. There she was X rayed and told there was "something growing round the kidney." She had had measles. On admission, there was no anæmia, and the patient appeared to be in health.

Examination of the urinary system: There were no subjective symptoms nor any increase in micturition. Traces of albumin were present in the urine for two days after admission. Otherwise, no abnormal constituents were found. No organisms, pus cells, or epithelial cells were found in films made from the urine. From cultures a streptococcus was obtained on one occasion. The apex of the heart was 2½ in. from the mid-line and the sounds were closed. The radial artery wall was not thickened, but the pulse wave was somewhat difficult to compress. A growth of streptococci was obtained from the blood. After rest for a few days, on light diet, the urine became completely free from albumin.

The patients were visited in January, 1924. All three boys were found to be perfectly fit and working constantly as coalminers. The urine in all cases was free from albumin, blood, and casts. The daughter, Alice, was well. Her urine, also, contained no abnormal constituents. A specimen of urine from the daugher (Ellen), who was not previously examined, was obtained. This was found to contain a trace of albumin, due to a bacteriuria presumably from a pyelitis. The urine of the father was again examined and found to be free from albumin.

## BACTERIOLOGICAL INVESTIGATION.

The bacteriological investigation originated in the course of the ordinary routine examination of catheter specimens sent from these cases. The initial findings of streptococci in the blood and urine of two of them suggested not only the desirability of confirming these results, but also of extending the bacteriological examination. The further observations were made in order to determine the identity and possible relationship of the streptococci isolated from the various sources, so that an opinion might be formed regarding a possible primary focus of infection.

The following method was adopted in classifying the streptococci. The hæmolytic test, used in dividing such organisms generally into two main groups, was initially applied. This was followed by division into sub-groups by Holman's method of classification,[12] in which lactose, mannite, and salicin are used in Hiss's serum-water with litmus as indicator. In regard to the use of fermentation tests in the classification of streptococci, the opinion seems to be that they lead to an unjustified multiplicity of sub-groups, which do not show any marked difference in their relation to disease processes. Like most fermentative tests, those advocated by Holman are not wholly reliable, and as tests, even in determining sub-groups, they have been found to be inadequate. Although the polysaccharide inulin is mentioned by Holman it is not included in his classification, having been mainly used by him in differentiating the pneumococcus from the streptococcus. This sugar was used for this purpose also in the present work, but in addition it was noted that the results obtained with the several strains studied served to indicate the inadequacy of Holman's classification in one direction at least. Such findings will be discussed later, but it may be mentioned that they confirm the conclusion arrived at by Logan[13] in regard to the sugar tests advocated by Holman being insufficient, and more adapted as a preliminary guide to serological tests, such as have been applied by several workers. By such means, Douglas, Fleming, and Colebrook[14] found that 24 strains of *S. pyogenes* were identical, although the sugar reactions differed. Similar observations have been recorded by Gordon.[15] This pertains to one member of the hæmolytic group, but it is possible that some members of the non-hæmolytic group, with which we are dealing in the present work, may also vary biochemically, yet be identical serologically.

### *Technique.*

The following observations are based on the bacteriological examination of the blood, urine, and teeth in all four cases, and, in addition, the tonsils and tonsillar region in three of the cases. Blood cultures were prepared by inoculating at least 2 c.cm. of the patient's blood into flasks containing 50 c.cm. of broth. These were examined daily, and sub-cultures were made on each succeeding day up to the seventh before pronouncing them negative. From catheter specimens of urine the centrifugalised deposit was inoculated into aerobic and anaerobic media. Preparatory to inoculating tubes from the teeth and tonsils the patients were asked to cleanse the teeth and mouth, after which the tonsils and pockets in decayed teeth were swabbed. It may be noted that in all cases the teeth showed caries in the incisors and molars to a greater or less degree. With the exception of Case 4, which failed to appear at a later date, the bacteriological examination was carried out on two occasions, an interval of four months having intervened.

### *Results of First Examination.*

A feature of the original blood cultures from Cases 1 and 4 was, that growth did not appear until the fifth and sixth day respectively. Pure growths of streptococci were obtained the following day in subculture. Similarly with the urine, delayed growth appeared on the third day of incubation and only in aerobic media. In all cases the cultures from the teeth yielded a mixed growth with streptococcal colonies in the majority. Several different-sized colonies were isolated in each case in view of the possibility of a mixed streptococcal

| — | Blood. | Urine. | Teeth. |
|---|---|---|---|
| Case 1: David S. | Streptococcus. | Streptococcus. | Mixed growth with streptococcal colonies in majority. |
| Case 2: John S. | No growth. | No growth. | |
| Case 3: Joseph S. | ,, | ,, | |
| Case 4: Alice S. | Streptococcus. | Streptococcus. | |

infection of hæmolytic and non-hæmolytic types. In applying the hæmolytic test, however, all the organisms proved to be of the non-hæmolytic variety.

*Results of Second Examination.*

In regard to the second series only three cases were examined, the tonsils and tonsillar region being included. The original blood cultures in broth, and the succeeding sub-cultures made each day up to the seventh, remained

| — | Blood. | Urine. | Teeth. |
|---|---|---|---|
| Case 1: David S. | No growth. | Streptococcus. | Mixed growth with streptococcal colonies in majority. |
| Case 2: John S. | ,, | No growth. | |
| Case 3: Joseph S. | ,, | ,, | |

negative and sterile. The urine in Case 1 again gave a pure though scanty growth of streptococci on the third day of incubation, the others remaining negative and sterile. The cultures from the tonsils in each case produced a mixed growth with streptococcal colonies in the majority. Individual colonies were tested as with those from the teeth, and were found to be of the non-hæmolytic type. The appearance of the growth in all the strains isolated was practically identical. All behaved similarly in producing an obvious greenish colouration by the hæmolytic test, and none showed definite hæmolysis; they were thus identified as of the non-hæmolytic, or viridans group, of which most members are regarded as saprophytic. They were differentiated from the pneumococcus by the bile-solubility test, by which means all were proved to be insoluble. Morphologically, they varied only in minor details, all of them showing a tendency to diplococcal formation in short chains.

The sub-groups were classified according to Holman's method already described. The purity of each strain was previously determined by microscopic examination before

FIG. 1.

To show numerous tube casts in urine of rabbit which died of acute nephritis.

inoculations of the sugars were made. The readings were noted daily for one week, and in most instances were based on the results of at least two separate series of sugar tests with each of the organisms. More recent results, which showed departure from the original reactions, are also included for reasons to be discussed later.

The streptococci isolated belong to the saprophytic group. The two types *S. mitis* and *salivarius* commonly live as harmless saprophytes in the mouth and throat, but may become pathogenic in certain circumstances. Their immediate interest here lies not only in their prevalence in the teeth and tonsils, but also in the possible relationship of the streptococci in these situations to their occurrence in the blood and urine of two of the cases.

These sub-groups of non-hæmolytic streptococci have been classified by their sugar reactions meantime, the reliability of which is much in question at the present time. The importance of such a division is considered more academic than real,[18] and of no great consequence from the point of view of their relation to disease.

The differentiation between *S. mitis* and *salivarius* depends on their behaviour towards salicin, in which sugar it has not been constant. One strain conformed to *S. mitis* and another to *S. salivarius* on the first two occasions. In tests repeated several times subsequently and on recent dates they interchanged their identity, judging entirely from

FIG. 2.

Section of rabbit's kidney, showing œdema, hæmorrhage, and acute tubular changes. Animal died in five days.

their reactions in salicin. That the sugar was not inert, or the organisms dead, were verified by the reactions of the other strains in the same batch of salicin, by microscopic examination and by sub-culture. Their reaction in inulin was also noted in which two strains of *S. mitis* and one of *S. salivarius* gave a positive reaction. On this latter feature, other characters being absent, Holman considers such organisms as inulin-fermenting varieties of their respective types. A similar inference suggests itself in the present case to account for the irregular reactions in salicin, in that one might be merely a variant of the other; and as with some specimens of *S. pyogenes* which differed in their behaviour towards mannite, yet were found to be serologically identical, so it may conceivably be in the present instance with *S. mitis* and *salivarius* that, though differing biochemically, they may be the same serologically.

The results of the investigation generally, apart from the question of academic points, present features of a suggestive nature. These features become more interesting, however, if the one organism may be considered a variant of the other. Whether this be so or not has not yet been determined, but it will suffice for the present purpose to note that they are of the non-hæmolytic group, and to consider their characters in this respect. Such streptococci closely associate themselves with chronic streptococcal infections, possess high power of invasion, and tissues in a state of low resistance are attacked by them. They stimulate little reaction on the part of the body, and apparently render the tissues more susceptible to reinfection with a fatal issue only after a prolonged course or repeated reinfections. They give rise to tonsillitis of a relatively mild form. Both *S. mitis* and *salivarius* have occasionally been found in pathological conditions in the blood and in endocarditis. In addition to other toxic agencies it is stated by MacCallum that streptococcal infections, especially protracted subacute infections with *S. viridans*, to which group the above organisms belong, may cause a glomerulo-nephritis with consequent destruction of the whole glomerular structure.

It is significant that the streptococci found in the blood and urine are not only closely allied, but may possibly be biologically identical with those isolated

from the teeth and tonsils, and that they are of the group associated with subacute infections, into which category the four cases may be classed.

## EXPERIMENTAL OBSERVATIONS. BY DR. BUCHANAN.

The association of non-hæmolytic streptococci with certain of the cases of subacute nephritis recorded above, suggested to one of us (G. B.) a general investigation into the rôle played by such streptococci in the production of experimental nephritis in rabbits. This work is at present in progress. It is the intention of this communication merely to indicate the nature of the experiments and such results as bear upon the problem of the causation of nephritis. The investigation when completed will form the subject of an independent paper.

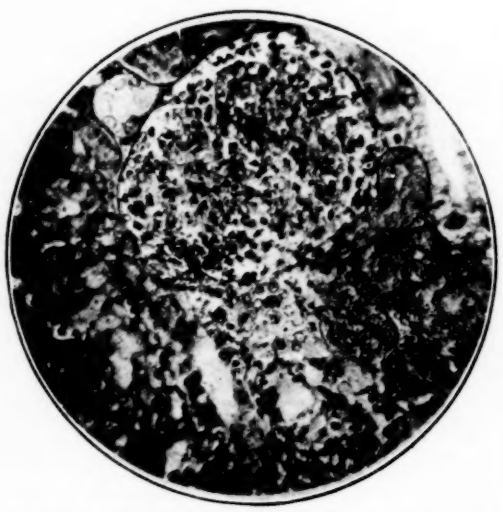
The strains of streptococci isolated from the earlier cases studied by us unfortunately died out before a licence for animal experiments was granted. Other cases of subacute nephritis were, however, investigated later, and from two of them a pure growth of a non-hæmolytic streptococcus was obtained from catheter specimens of urine. The two organisms conformed biochemically to *S. fæcalis*. These were used for experimental purposes.

The animals selected for this work were kept under observation for one week before beginning the experiments. Only those whose urine was entirely free from albumin and other evidence of renal trouble were used.

The nature of the experiments consisted in a study of the effects produced on the function and structure of the kidney by the following agencies: (1) Cold and damp; (2) cold and damp, plus streptococcal blood infection; (3) streptococcal blood infection.

The method used in determining the effects of cold and damp was that adopted by Cicconardi,[17] in which a freezing

FIG. 3.



Section of rabbit's kidney showing acute glomerulo-nephritis and tubular degeneration. Animal died in seven days.

mixture is applied to the dorsum in the region of the kidneys. The object in the present work was to ascertain if the influence of local chilling, as a predisposing factor, rendered the kidney more susceptible to injury by the action of the circulating streptococci. The repeated daily chilling, applied for one hour, constantly lowered the rectal temperature 2° C., but urinary examination revealed no abnormal constituents. No very marked alteration in kidney structure was noted in chilled animals chloroformed at varying intervals. The introduction of repeated doses of streptococci into the circulation after chilling has so far not given uniform results. It was thought at first that the chilling induced a more rapidly fatal issue, but later it was found that the injection of streptococci alone was as rapidly fatal in some instances, and produced almost similar kidney lesions.

It will meet the present purpose to state briefly that as a result of the intravenous injection of the non-hæmolytic streptococcus, *S. fæcalis*, into rabbits symptoms of acute nephritis were produced. Albumin in considerable quantity appeared in the urine within the first week after inoculation. In some cases it increased daily in amount, and persisted until the animals died. In other instances where the animal survived for a longer period the albumin decreased and almost disappeared. Microscopically (Fig. 1) the urines of these animals invariably showed abundant tube casts, chiefly hyaline in nature, although granular, epithelial, and blood forms were also present. Red cells and epithelial cells were very numerous.

In some animals which succumbed shortly after inoculation the post-mortem examination showed an accumulation of fluid in the pericardial sac and abdominal cavity. This appeared to be a result of the nephritis; no evidence of pericarditis or peritonitis was observed. In such cases the kidney presented the typical microscopical changes associated with acute diffuse nephritis. Particularly marked was the degree and extent of the œdema, which is shown in Fig. 2. In animals which survived for longer periods the kidney showed progressive degenerative changes, chiefly in the glomeruli (Fig. 3) and Bowman's capsule (Fig. 4). Accumulations of lymphoid cells also became prominent in areas affected by hæmorrhage and œdema. The accompanying micro-photographs illustrate the changes referred to above.

FIG. 4.

Section of rabbit's kidney showing marked thickening of Bowman's capsule. Stained by Mallory's method.

## SUMMARY.

1. That nephritis may be hereditary, familial, or congenital is shown well in the families described by Hurst and others.

2. It would seem that a familial predisposition to nephritis exists in a series of cases instanced by us and notably in two families.

3. In one family there was an association of apoplexy and nephritis, six members of the family being affected by one or both. The discovered onset was at or after middle life.

4. In the second family there were seven cases, of which five were discovered in childhood or adolescence. Four of the cases in this family were diagnosed within a few weeks of one another. That the actual origin was not recent, but of some years' standing, is evident from the fact that the arteries in three were thickened, the blood pressure high, and the non-protein nitrogen of the blood high.

5. No definite ætiological factor could be found in these cases to account for either the nephritis, high blood pressure, or thickened arteries. Syphilis is discounted by a negative Wassermann reaction in all cases. There is no history of scarlet fever or influenza in any of the cases.

6. In one case there is a definite history of chill immediately preceding the onset of the disease.

7. Pure growths of non-hæmolytic streptococci were obtained from the blood and urine of two cases on admission to hospital.

8. Blood cultures carried out four months later yielded no growth.

9. A streptococcus was obtained twice from the urine of one case while in hospital, and again on his return for a later examination.

10. A feature of note in primary cultures was the delay and feeble nature of the growth, which only appeared between the third and sixth day of incubation.

11. The types of streptococci isolated from the blood and urine were biochemically identical with those obtained from the teeth, tonsils, and tonsillar region. Such streptococci commonly live as harmless saprophytes in the mouth and throat, but may become parasitic and associate themselves with subacute infections.

12. In addition to the presence of intrinsic weakness causing a "locus minoris resistentiæ" in the kidney, a possible extrinsic factor in the recurrent attacks of nephritis may possibly be due to streptococcal infections.

13. There is considerable evidence for the conclusion that the teeth and tonsils may be regarded as among the important primary sources of infection, and probable portals of entry for hæmatogenous infection. It is possible that repeated infections may occur at such times when the normal resistance of the tonsils and tissues is lowered from local or general causes. Such infections may exercise an exacerbating influence in the course of the disease.

14. The failure to confirm the result of the first bacteriological examination of the blood, and the negative findings in two of the cases, suggest a focal infection producing disease by periodic systemic invasion—that is, a transient bacteræmia with rapid localisation of the invading organism in such organs most susceptible to its power of invasion, resulting in a focal expression of infection. In the family studied the kidney appears to be singularly predisposed to infection and the most susceptible organ.

15. Experimental evidence is given on the causation of nephritis by a non-hæmolytic streptococcus isolated from cases of subacute nephritis.

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# GRADUATED EXERCISE IN PULMONARY TUBERCULOSIS.

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DURING the years 1920, 1921, and 1922 graduated exercise was employed as a form of treatment at King Edward VII. Sanatorium in 624 cases of pulmonary tuberculosis. Table I. shows the results from the replies to inquiries sent out in 1924; Table II. shows the cases classified according to the Turban-Gerhardt classification; while Table III. gives the result of treatment according to the stage of the disease.

The fact that 78·1 per cent. of Group 1 cases and 53·7 per cent. of Group 3 cases are well emphasises the importance of early diagnosis and treatment. The death-rate of cases in Group 1 (5·3 per cent.) compared with the death-rate of cases in Group 3 (26·3 per cent.) has equal significance.

Not all the cases admitted to and discharged from the sanatorium in these years are included in the following tables, and in this sense the cases recorded are to be regarded as picked cases, inasmuch as only those cases were allowed to attempt any graduated exercises whose condition appeared to justify it, and only those cases are included whose condition and response enabled them to reach the higher grades. In considering the results of a particular form of treatment it has appeared reasonable only to include those patients who had actually experienced that treatment.

The theory of auto-inoculation has been the controlling principle in the graduation of the exercise, and the relation between toxic absorption and muscular action has been constantly controlled and observed.

TABLE I.—*Showing Results from Replies to Inquiries Sent Out in 1924.*

| Well and at work or leading a normal life. | Not well. | Alive, no details. | Dead. | Not reported. | Total alive. |
|---|---|---|---|---|---|
| 416 = 66·7 % | 72 = 11·5 % | 13 = 2·1 % | 91 = 14·6 % | 32 = 5·1 % | 501 = 80·3 % |

TABLE II.—*Turban-Gerhardt Classification.*

Group 1 .. 243 .... Group 2 .. 206 .... Group 3 .. 175.

TABLE III.—*Showing Results of Treatment according to Stage of Disease.*

| — | Well and at work or leading a normal life. | Not well. | Alive, no details. | Dead. | Not reported. |
|---|---|---|---|---|---|
| G. 1 | 190 = 78·1 % | 21 = 8·6 % | 5 = 2·2 % | 13 = 5·3 % | 14 = 5·8 % |
| G. 2 | 132 = 64·1 % | 25 = 12·1 % | 6 = 3·0 % | 32 = 15·5 % | 11 = 5·3 % |
| G. 3 | 94 = 53·7 % | 26 = 14·8 % | 2 = 1·1 % | 46 = 26·3 % | 7 = 4 % |

Symptoms which have been regarded as an indication of an excessive toxic absorption have been the following: an evening rise of temperature above 99° F. oral, slight headache, increase of cough and sputum, excessive fatigue, loss of appetite, aching in back or limbs, and general malaise. Table IV. shows the numerical occurrence of such symptoms and also shows that, as might be expected, the incidence increases as the stage of the disease advances.

TABLE IV.—*Showing Numerical Occurrence of Symptoms regarded as an Indication of Excessive Toxic Absorption.*

Group 1: Of 243 cases 73, or 30 per cent.
Group 2: Of 206 cases 80, or 39 per cent.
Group 3: Of 175 cases 92, or 53 per cent.

The maximum temperature recorded was 104·8° F., but this was exceptional, the rise usually observed being about 100°. The maximum number of such reactions to occur in any one case was nine. These reactions when observed were controlled by absolute rest in bed until the evening temperature returned to a normal level and the symptoms subsided, and the patient looked and felt well. He then returned by gradual stages to the grade of exercise which had caused the reaction. The maximum period for which an individual was kept on absolute rest was 21 days, and the shortest time taken to return to a grade of exercise after a reaction was three days. It is of interest to note that many cases of raised temperature accompanied by symptoms of toxæmia occurred immediately after admission to the sanatorium following the exertion of the journey, and also that the majority of the reactions occurred during the earlier stages of the treatment—e.g., walks of a mile or two, or the lighter grades of garden work.

Only those cases have been recorded as reactions which were immediately related to an increase of

exercise and were accompanied by the usual symptoms of excessive toxic absorption. Rises of temperature which might be explained by other causes—e.g., dental trouble, constipation, or premenstrual rises—have not been included.

The grades of exercise progress from absolute rest in bed or no exercise at all, to being in bed all day but not on absolute rest, to being up for increasing periods during the day, to taking an increasing amount of walking exercise, and, only when the individual progress and condition permit, to exercises in gardens and grounds and recreations involving exercise such as golf.

All exercise is prescribed and carried out under close medical supervision. This is essential, not only in order to observe how each individual is responding, but also to prevent the prescription being exceeded. A non-medical supervisor is apt to regard the necessity of the work to be done as more important than the medical requirements of any particular case.

The attitude of mind referred to as "spes phthisica" is frequently marked in the later stages of the disease and is usually a bad prognostic feature. It is conspicuous by its absence in the earlier stages, a spirit of moroseness and depression being far more frequently observed. A significant feature of successfully conducted graduated exercise is the way in which a patient's cough and sputum diminish, the temperature excursions and variations become less marked, and depression gives way, not to a groundless hopefulness, but to a cheerful alertness, so that the individual's nature seems to have undergone an entire change for the better.

## THE USE OF INSULIN IN OPERATIONS ON THE DIABETIC.

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ALTHOUGH the more recent dietetic methods of Allen and Joslin[1] have already begun to diminish the mortality following surgery in the diabetic, the use of insulin in selected cases seems to remove the risks altogether. These risks are, briefly, the liability to post-operative infection and the event of coma, and are mainly due to anæsthesia and shock, both of which produce the hyperglycæmia, the control of which is the main aim of management. In operations on the non-diabetic ether anæsthesia produces hyperglycæmia, glycosuria,[2] and a lowering of the alkali reserve.[3] In two cases which we investigated results were obtained as given in Table I. (values expressed as mg. per 100 c.cm. blood).

TABLE I.

| — | Length of ether administration. | Arterial glucose. | Venous glucose. |
|---|---|---|---|
| 1 | 15 mins. | 110 | 100 |
| 2 | 40 mins. | 171 | 150 |

It will be noted that the arterial value is higher than the venous, which we attribute to increased glycogenolysis in the liver.

In operations on the diabetic the rise in blood-sugar and the fall in alkali reserve are both greater, and, moreover, the glucose value of venous blood tends to become greater than that of the arterial blood, a condition which we have found to occur repeatedly in severe and untreated diabetics. This is shown in the following case (Table II.) which was operated on for umbilical hernia. Insulin was not used.

TABLE II.

| Period. | Arterial glucose. | Venous glucose. | $CO_2$ vols. per cent. |
|---|---|---|---|
| Before operation .. .. | — | 99 | 57 |
| After ether induction— | | | |
| 10 mins. .. .. .. | 201 | 150 | 44·8 |
| 30 mins. .. .. .. | 294 | 315 | 45·9 |
| 60 mins. .. .. .. | 281 | 301 | 45·9 |

As will be shown below, insulin decreases ether-hyperglycæmia, but does not always succeed in producing what appears to be the typical insulin effect of raising the value of the glucose of arterial blood above that of the venous blood. Even after the administration of insulin the hyperglycæmia continues for several days, the length of time depending upon the original severity of the case, length and severity of the operation, and upon the occurrence of post-operative complications. Even when we have controlled the hyperglycæmia during operation we have found that it has subsequently been reproduced by post-operative sepsis; in support of this we have

TABLE III.

CASE 1.—Subtotal hysterectomy in a woman aged 50. Ether 55 minutes.

| Time after induction of ether. | Arterial glucose. | Venous glucose. | $CO_2$ vols. per cent. | Insulin (c.cm.). | Diet. |
|---|---|---|---|---|---|
| Before | — | 162 | 53 | 0·5 (d.) | 4F3P½C |
| 10 mins. | 193 | 218 | 36 | — | — |
| 20 mins. | — | — | — | 0·8 | — |
| 30 mins. | 231 | 238 | 35·5 | — | — |
| 90 mins. | 214 | 232 | 38 | — | — |
| 2 days | — | 300 | 35·7 | 0·5 (d.) | Milk* |
| 3 days | — | 188 | 61 | 1·0 (d.) | Milk |

CASE 2.—Amputation of the toe on a man aged 64. Ether 10 minutes.

| | | | | | |
|---|---|---|---|---|---|
| Before | — | 222 | — | 0·5 | CHO free |
| 5 mins. | 200 | 143 | 42·8 | — | — |
| 15 mins. | — | — | — | 0·5 | — |
| 20 mins. | 192 | 191 | 49 | — | — |
| 45 mins. | 187 | 187 | 30·6 | — | —* |
| 30 hrs. | — | 580 | 60 | 1·0 (d.) | Milk |
| 3 days | — | 300 | 51 | 1·0 (d.) | " |

* Bicarbonate of soda, gr. xxx., t.d.s.

CASE 3.—Laparotomy on a man aged 52. Ether 30 minutes.

| | | | | | |
|---|---|---|---|---|---|
| Before | — | 173 | 52 | 0·5 (d.) | 3F3P1C |
| 15 mins. | 136 | 125 | 45 | — | — |
| 70 mins. | — | — | — | 0·8 | — |
| 90 mins. | 200 | 214 | 39 | — | — |
| 2 days | — | 260 | 48 | 0·5 (d.) | Milk |
| 10 days | — | 139 | 51 | 0·5 (d.) | CHO free |

CASE 4.—Amputation of toe on a man aged 60. Ether 20 minutes.

| | | | | | |
|---|---|---|---|---|---|
| Before | — | 166 | 53 | 0·5 (d.) | 3F3P1C |
| 15 mins. | 168 | 140 | 47·9 | — | — |
| 40 mins. | 168 | 140 | 47·9 | 0·75 | — |
| 70 mins. | 190 | 180 | 46·8 | — | — |
| 7 days | — | 125 | 52·4 | 0·5 (d.) | CHO free |

CASE 5.—Umbilical hernia in a man aged 44. Ether 20 minutes.

| | | | | | |
|---|---|---|---|---|---|
| Before | — | 99 | 57 | 0·5 (d.) | 4½F2P1C |
| 10 mins. | 205 | 150 | 44·8 | — | — |
| 30 mins. | 294 | 315 | 45·9 | — | — |
| 60 mins. | 281 | 301 | 45·9 | — | — |
| 24 hrs. | — | 238 | 45·2 | 0·5 (d.) | CHO free |
| 4 days† | — | 500 | 57 | 1·0 (d.) | — |
| 5 days | — | 429 | 60 | 2·0 (d.) | — |
| 12 days | — | 196 | 53·5 | 1·0 (d.) | — |

†Pyrexia and bronchitis.

CASE 6.—Amputation of leg on a man aged 64. Ether 25 minutes.

| | | | | | |
|---|---|---|---|---|---|
| Before | — | 200 | 51 | 2·0 (d.) | CHO free |
| 10 mins. | 120 | 120 | 45·4 | — | — |
| 25 mins. | 113 | 120 | 41·5 | 0·5 | — |
| 45 mins. | 96 | 93 | 42·3 | — | — |
| 24 hrs. | — | 580 | 60 | 0·5 (d.) | CHO free |
| 3 days | — | 300 | 51 | 0·5 (d.) | " |

(d.) = daily.

the figures of Joslin[4] for cases occurring in the Massachusetts General Hospital from 1913 to 1918. Here the mortality of diabetics with infection was 50 per cent., and without infection 12 per cent. The

alkali reserve also remains low for several days unless alkalis are administered.

*Technique.*

The technique which we employed may be divided into the following stages.

1. *Preparation Before Operation.*—For this at least a week appears to be necessary, during which hyperglycæmia and acidosis are removed and the patient is brought into nitrogenous equilibrium by appropriate diet and insulin dosage which naturally varies in each case. We did not attempt to fill the liver with glycogen as advocated by Joslin [5] and Barborka.[6] No food was given on the day of operation, half an hour before which 10 units of insulin were given.

2. *During Operation.*—Ether was invariably employed as an anæsthetic and was administered by the open method. Blood was removed simultaneously from the radial artery and median basilic vein at intervals of 20 minutes. Half an hour after the induction of anæsthesia insulin was given in amounts varying with the nature of the case.

3. *After Operation.*—This appears to be the most critical period. The patient was put on a milk diet, and the dosage of insulin governed by the magnitude of the post-operative hyperglycæmia. In post-operative infection either in the wound or arising from pulmonary conditions the reduction of hyperglycæmia presented great difficulty. A low post-operative alkali reserve may be effectively removed by alkalis as in Case 1.

The method used for the determination of glucose in the blood was the one described by Folin and Wu.[7] The carbon dioxide combining power of the blood was estimated by Van Slyke's method.[8] Diets used are in accordance with a simple scheme devised by one of us.[9] Operations were performed by Mr. G. C. E. Simpson and Dr. Leith Murray. Ether was administered by the open method preceded by the usual hypodermics.

*Summary.*

Ether anæsthesia in the diabetic produces a more severe hyperglycæmia and a greater fall in the alkali reserve than in a non-diabetic. They may be controlled by the pre-, intra-, and post-operative use of insulin. In spite of the administration of insulin the post-operative complication of sepsis appears to maintain both hyperglycæmia and a low alkali reserve; the latter may be restored by alkali therapy.

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## A CASE OF METASTATIC GAS GANGRENE IN CIVIL PRACTICE.

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THE following case presents a clinical picture so rare as to merit publication.

C. W., a coalman, aged 35, was admitted to the Western Infirmary, Glasgow, on March 21st, 1924. He stated that he had swung himself up on his lorry while it was in motion, whereupon he was seized immediately with epigastric pain so severe that he fell upon the pavement, where he remained until the arrival of the ambulance which brought him to the infirmary. On admission the temperature (rectal) was 99·2° F., the pulse 118, and the respirations 24. The whole abdomen was board-like in its rigidity and exquisitely tender. The patient was in great agony and collapsed. There was no vomiting. It was found that for two years he had suffered at intervals from epigastric pain, which occurred shortly after meals; he had rarely vomited. The gastric symptoms had never been so severe as to force him to consult a doctor. A slight degree of constipation had been present for the same period.

A diagnosis of perforation of a gastric ulcer was made, and without delay I opened the abdomen through the upper part of the right rectus muscle. The peritoneal cavity contained a considerable quantity of turbid, straw-coloured fluid, which was removed with gauze sponges as completely as possible. Examination showed that the lesser curvature of the stomach, rather towards its pyloric end, was occupied by a large saddle-shaped ulcer. Attached to the peritoneum over the anterior half of this ulcer was a mass of partially organised fibrin about 2 inches in diameter, and in form like the top of a mushroom turned upside down. More recent adhesions bound this mass to the anterior edge and under surface of the left lobe of the liver. Tunnelling through its middle was a perforation which admitted the tip of the little finger. Invagination of the perforated ulcer was impossible owing to the presence of the bulky mass of fibrin; temporary drainage of the peritoneal cavity seemed insufficient in view of the length of the perforating passage and the hard unyielding character of its walls, so that primary V-shaped resection of the whole ulcerating area was decided upon as the only hopeful line of treatment. This was performed as rapidly as possible, silk being used for the outer Lembert suture and catgut for the inner suture. The incision was closed in layers without drainage, and a tube containing a gauze wick was placed in the recto-vesical pouch through a separate median suprapubic stab wound.

At the close of the operation the condition of the patient was very grave. On his return to the ward a pint of saline solution was administered by the rectum, and strophanthin gr. 1/250 was injected hypodermically; rectal salines (10 oz.) and strophanthin, gr. 1/250, were ordered to be given every four hours. On the following day the patient was still very ill—temperature 101·8° F., pulse 156, respirations 36. On the second morning after operation, however, his condition was markedly improved. The temperature was 99·2°, and the pulse 112, and the respirations 28. The dose of strophanthin was reduced to gr. 1/250 every six hours. The improvement was well maintained throughout the day, but about midnight he complained of pain in his right upper arm, and the pulse-rate rose to 120. Examination showed a diffuse reddening of the outer wall of the right axilla, to which a wet dressing was applied. By the morning of the third day the temperature had risen to 102°, the pulse to 140, the respirations to 32, and he was slightly jaundiced. His general condition was obviously hopeless. Examination of the right arm revealed a diffuse swelling extending along the inner aspect of the arm from about 3 inches above the level of the elbow-joint to the apex of the axilla. The skin over this area was a dusky purple colour and insensitive and crepitation could be elicited over its whole extent. Two parallel longitudinal incisions were made throughout the whole length of the swelling; these allowed the escape of gas under considerable tension. The muscles on the inner aspect of the arm were pale, quite necrotic, and riddled with gas bubbles. The wounds were swabbed out with peroxide of hydrogen, and a wet dressing was applied.† The patient died at 1 P.M., exactly 72 hours after the perforation of his ulcer; he had exhibited to a marked degree the retention of mental faculties found in this type of infection.

*Bacteriological Report.*

A portion of the necrotic material from the arm, obtained during life, was examined in the clinical laboratory of the Western Infirmary by Dr. E. M. Dunlop, who reported:—

"No growth was obtained on aerobic cultures. Under anaerobic conditions a growth of a Gram-positive bacillus was obtained, and this culture, when plated, yielded abundant colonies which, macroscopically, were all of the same type. Twelve of these were subcultured in litmus-milk, and in each instance the characteristic "stormy" fermentation associated with *B. welchii* was obtained after a short period of incubation. In deep glucose-agar shake cultures the organism grew rapidly, and led to abundant gas production. Films made from the various cultures were examined; in each case the growth appeared to be pure, and the organism had the microscopic characters of *B. welchii*. It grew only

* During the tenure of a grant from the Medical Research Council.

† Messrs. Burroughs, Wellcome and Co. inform me that they have still in stock antitoxic serum for administration in cases of gas gangrene due to *B. welchii*. As this serum was prepared some years ago they naturally do not guarantee its potency, but it might prove useful in such an emergency as descr ibe .

under anaerobic conditions, and exposure of surface cultures to the air for a few hours was found to prevent growth on subsequent anaerobic subcultures. Spore formation has not been observed, and attempts to produce it have been unsuccessful."

*Post-mortem Examination.*

At the necropsy, performed by Dr. J. W. S. Blacklock 24 hours after death, the muscles on the inner side of the right upper arm were found to be necrotic. Numerous small gas cavities were present, and these extended into the tissues on the right side of the neck. Dissection revealed no evidence of embolism or thrombosis in the brachial artery or in its main branches in this region. The abdominal surgical incisions were healthy. A slight degree of plastic peritonitis was present, the coils of bowel being irregularly congested and matted together by fibrinous lymph. No leakage was found at any part of the repair of the stomach, and this wound appeared to be healing normally. The intestine showed no gross morbid change. The liver showed some fatty change, and small bubbles of gas could be expressed from the branches of the portal vein. The spleen was enlarged (weight 9 oz.), dark red, and firm. Slight fatty changes were present in the kidneys, which were otherwise healthy. The pericardial sac contained a small quantity of blood-stained fluid. The heart wall showed cloudy swelling and the endocardium was deeply stained with hæmoglobin. All the valves were healthy and competent. The intima of the aorta was deeply stained with hæmoglobin. The lungs showed well-marked recent venous congestion. In smears from the muscles of the arm were found large numbers of an organism morphologically resembling *B. welchii*, together with cocci. Culture of the muscle anaerobically showed the former organism. Smears and cultures from the spleen demonstrated the presence of an organism morphologically resembling *B. welchii* in practically pure culture. (The organisms other than *B. welchii* were doubtless due to post-mortem contamination—see bacteriological report on tissue obtained during life.) On section the gastric ulcer proved to be of the chronic inflammatory type. Some attempt at healing was present, and at one part of the base of the ulcer more recent acute inflammatory change was found.

*Comment.*

Gas gangrene is but rarely encountered in civil surgery; Christopher (1922)[1] found nine cases recorded by seven writers. Almost all the cases fall into two groups. In the first group gas gangrene occurs as a complication of various forms of injury sustained under conditions favouring infection from the soil. In the second group it follows septic abortion. Its occurrence has also been noted in the scrotum,[2] in the gall-bladder,[3] and as a complication of ischio-rectal abscess.[4]

The most unusual feature of the case reported is the metastatic nature of the gangrenous focus. Septicæmic and pyæmic manifestations in infections by gas-producing bacilli are to be regarded as complications of what is usually a local process which causes a profound toxæmia; although invasion of the blood by the causative organisms rapidly occurs after death. On the other hand, gas production is not uncommonly seen post mortem in the organs of subjects dying of other diseases; in these cases the bacilli enter the blood after death from the bowel, of which they are normal inhabitants. It is necessary in such cases to be cautious in assigning ætiological value to the results of examinations of material obtained in the post-mortem room.

Cases of metastatic gas gangrene following war wounds have been recorded.[5] The factors determining the sites of secondary foci appear to be slight local injury—for example, an hypodermic injection, or any interference with the blood-supply of the part, whether this be the result of injury to a main artery or of prolonged maintenance of one position, when the local ischæmia thus produced—for example, in the buttock—may determine gangrene. In the latter situation direct infection from the bowel cannot be excluded, and this was probably the source in the ischio-rectal case referred to above. Neither of these factors could be established in the case reported. The only injection given into the right arm was an attempt soon after the operation to introduce strophanthin into the median basilic vein immediately below the level of the elbow-joint, some 3 inches distal to the lower margin of the gangrenous area. Examination both before and after death revealed no sign of injury to the arm, and certainly there was no gross abrasion of skin. There can be little doubt that the infection originated in the alimentary tract, though the actual portal of entry into the blood-stream remains obscure. It is possible that the organisms were present in the stomach at the time of operation, when the vessels opening on the cut surfaces of the gastric wall would offer a channel; on the other hand, infection may have occurred through some minute area of the wall of the bowel partly devitalised by handling during the operation.

I am indebted to Prof. Archibald Young, to whose wards the patient was admitted, for permission to publish this case.

*References.*

1. Christopher, F. (1922): International Clinics, i., 129.
2. Thibault, A., and Schulmann, E. (1919): Bull. et Mém. Soc. Méd. d. Hôp. de Paris, xliii., 70.
3. Hallé and Marquézy (1922): Bull. et Mém. Soc. Méd. d. Hôp. de Paris, xlvi., Jan. 13th.
4. Berkow, S. G., and Tolk, N.R. (1923): Jour. Amer. Med. Assoc., lxxx, 23.
5. Weinberg, M., and Seguin, P. (1917): La Gangrène gazeuse, 250. (Monographies de l'Institut Pasteur.)

# Clinical and Laboratory Notes.

## INJURIES ABOUT THE ELBOW-JOINT.

BY V. F. SOOTHILL, M.D. CAMB., D.P.H.,
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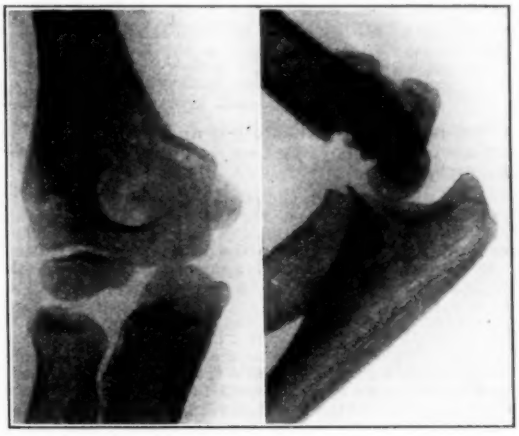
THIS is a plea for the more frequent use of X rays in the above class of injury. The following cases, illustrating the necessity, have attended the Ilford School Clinic in a little over a year:—

CASE 1.—A. B., aged 8. This child fell and injured her left elbow and was seen by a medical man who was of opinion that there was no fracture. About three days later she attended the school clinic and the swelling aroused

1 2



X ray illustrations showing fracture of elbow-joint (Case 1).

suspicion of a fracture, which was confirmed by X rays. She was sent by her doctor to hospital for treatment. The plates illustrating this fracture (Figs. 1 and 2) were kindly supplied from Great Ormond-street Hospital. The radiologist's report is, "Supracondylar fracture—comminuted. Slight inward and backward tilt of main fragment."

CASE 2.—C. D., aged 7. The history of this case was given as follows. The boy fell on Jan. 16th, 1924, and injured his right elbow. He received treatment from a medical man, who said that the child need not attend again. A week later, dissatisfied with the condition of the boy's arm, the parent brought him to the school clinic. The

nature of the swelling suggested a fracture, which was confirmed by X rays. He was transferred to hospital for treatment. He still has considerable deformity and limitation of extension. The radiologist's report is, "Separated epiphysis, lower end of humerus, with backward displacement."

CASE 3.—E. F., aged 13. Fell and injured his left elbow on March 17th, 1924. He attended the school clinic next day. There was some swelling and, as I could not exclude fracture, he was X rayed. There was no fracture. I saw him again four days later and the swelling presented the typical appearance of fluid in the joint. I include this case for comparison with Case 4.

CASE 4.—G. H., aged 8. This boy fell and injured his left elbow on March 21st, 1924. He attended the school clinic next morning (Saturday). There was a little swelling, but I could find no evidence of fracture, and considered it a case of synovitis like Case 3. An X ray was unobtainable that day, so the arm was bandaged to the chest in a flexed position, and the mother instructed to return with him on Monday. On the Monday the extent of the swelling suggested a fracture, which was confirmed by X rays, and the boy was transferred to hospital for treatment. The radiologist's report was, "Separated epiphysis, lower end of humerus. No displacement."

Of these four consecutive cases of injury to the elbow, three were fractures and not one of them was diagnosed when first seen. Probably they were not diagnosable except by skiagram, as Cases 1 and 2 had both been seen by medical practitioners who had not informed the parents of any fracture; and I could not tell the difference, on first seeing them, between Cases 3 and 4, although one had a fracture and the other had not. The necessity for discovering definitely the presence of fracture, even if "only" a separated epiphysis, is shown by the poor result in Case 2. If an X ray is not obtainable immediately, the case should be seen again, and if there be any suspicion of fracture a skiagram should be obtained even at the cost of some trouble. I have found that a generalised swelling, not confined to the synovial membrane and still seen on and after the third day, strongly suggests the advisability of obtaining a skiagram.

I am indebted to Dr. A. H. G. Burton, medical officer of health of Ilford, for permission to publish these cases.

## VAGINAL HÆMORRHAGE FROM PERFORATING ENDOTHELIOMA.

BY W. B. COSENS, M.R.C.S. ENG.,
HON. SURGEON, DORSET COUNTY HOSPITAL.

THE rarity of this condition and the youth of the patient justify recording this case of alarming vaginal hæmorrhage.

Miss ——, aged 20, had been apparently in excellent health, the last period having ended 14 days previously. At 7 A.M. she was seized with severe vaginal hæmorrhage. Dr. T. B. Broadway, of Dorchester, found, under an anæsthetic, a large tumour pressing down the anterior wall of the vagina, but was unable to palpate the cervix. There was a well-formed hymen.

On admission to hospital the hæmorrhage continued in spite of gauze-packing. A hard, but slightly resilient, mass was felt resembling in contour a seven months' pregnancy. The abdomen was opened and a tumour was shelled out of the retroperitoneal space between the bladder and vagina; it was adherent to the anterior vaginal wall. The tumour weighed 1 lb. 2 oz. There was an abscess between the anterior fornix and the adherent part of the tumour, the hæmorrhage being due to perforation of the vaginal arteries in the site of the abscess cavity. Owing to the total disorganisation of the upper portion of the vagina, and its septic condition, the uterus was removed.

*Pathological Report.*—"An encapsulated, solid, and capillary fibro-hæmangio-endothelioma of vaginal wall."

The patient is now in excellent health. It is a question of doubt if she should receive X ray vaginal treatment, the ovaries being left and apparently healthy. The specimen is to be shown by Dr. Russell Andrews at the next meeting of the Section of Obstetrics and Gynæcology, Royal Society of Medicine.

# STUDENTS' GUIDE—SESSION 1924–25.

## DENTAL SURGERY.

APPEARANCE on the Medical Register entitles a practitioner to practise as a dentist, although he cannot register as such without degree or licence in dentistry; but few dental appointments at general or special hospitals or dispensaries are available save to those with a special diploma.

In THE LANCET of August 30th (p. 477) we outlined the constitution of the Dental Board of the United Kingdom, and the regulations in regard to the registration of dental students. In the following syllabus the respective requirements of the various examining bodies in dentistry are set forth, together with the facilities for dental study offered by certain other institutions.

### THE EXAMINING BODIES IN DENTISTRY.

THE ROYAL COLLEGE OF SURGEONS OF ENGLAND grants a diploma in Dental Surgery under the following regulations, which apply to all candidates who have passed the required Preliminary Examination in General Education before Jan. 1st, 1923.

Candidates are required to pass three examinations: the Preliminary Science Examination, the First Professional Examination, and the Second Professional Examination. 1. Preliminary Science Examination.—This is identical with Part I. of the First Examination of the Examining Board in England. Candidates who commenced professional study on or after Oct. 1st, 1913, must pass the Preliminary Science Examination before commencing the courses required for the Second Professional Examination. 2. The First Professional Examination.—The candidate must produce evidence of instruction in Dental Metallurgy and Practical Dental Mechanics. The Examination consists of Part I. (Mechanical Dentistry), Part II. (Dental Metallurgy), the examination in Dental Metallurgy being by written paper, and Part III. (*a*) General Anatomy and Physiology, (*b*) Dental Anatomy and Physiology conducted by papers and vivâ voce examination. The parts may be taken together or separately. 3. The Second Professional Examination.—This is divided into two parts: (*a*) the General, (*b*) the Dental. The General part must be passed before the Dental portion. The instruction is obtained partly at a General Hospital and partly at a Dental Hospital. The Second Professional Examination consists of: Part I., General Surgery and Pathology; Part II., Dental Surgery and Pathology, and Practical Dental Surgery. There is a written and vivâ voce examination in each part and a practical examination as well in Part II. Exemption from the Preliminary Science Examination is granted to candidates who have passed an Examination in Chemistry and Physics for a degree in Medicine at a University in the United Kingdom, in India, or in a British colony. Exemption from Examination in Anatomy and Physiology is granted to candidates who have passed the Second Examination of the Examining Board in England or the corresponding Examination for any degree or qualification in Medicine or Surgery registrable under the Medical Act of 1886. Exemption from Examination in General Surgery and Pathology is granted to candidates who have passed the Examination in Surgery of the Examining Board in England or the corresponding Examinations of the Colleges and University above mentioned. The fee for the diploma is 20 guineas, and is payable as follows: Preliminary Science Examination, for each admission to Part I., £3 3*s.*; Part II., £2 2*s.* First Professional Examination, for each admission to Part I., £4 4*s.*; Part II., £1 1*s.*; Part III. (*a*) £2 2*s.*; (*b*) £2 2*s.*; Second Professional Examination, for each admission to Part I., £2 2*s.*; Part II., £4 4*s.*

The following Regulations will apply to all candidates who pass the Preliminary Examination in General Education on or after Jan. 1st, 1923.

1. Candidates for the Licence in Dental Surgery of the Royal College of Surgeons of England are required to pass one of the Examinations in General Education recognised by the Conjoint Examining Board in England, and the Pre-Medical Examination in Chemistry and Physics conducted by that Board or one of the examinations recognised in lieu thereof, before they commence the curriculum of professional study forthe Licence extending over four years.

2. Candidates who produce evidence of having been registered by the General Medical Council as Medical or Dental Students on or after Jan. 1st, 1923, will be considered to have passed the required Preliminary Examination in General Education and the Pre-Medical Examination.

3. Candidates who hold the degree of D.M.D. Harvard, D.D.S. Pennsylvania, D.D.S. Michigan, D.D.S. Illinois, D.D.S. St. Louis, Missouri, D.D.S. Northwestern University, Chicago, D.D.S. Minnesota, D.D.S. Sydney, or the Licence of the Dental Board of Victoria, Australia, are not required to pass these Examinations.

*First Professional Examination.*—1. The First Professional Examination consists of Part I. Dental Mechanics, Part II. Dental Metallurgy, and Part III. Section (*a*) General Anatomy and Physiology, Section (*b*) Dental Anatomy and Physiology, and is held in January or February, April, and September or October in each year.

2. Candidates may present themselves for the several Parts of the First Professional Examination together or separately, but before admission to any part of the Examination they must produce evidence of having passed the required Preliminary Examination in General Education and the required Pre-Medical Examination or a certificate of having been registered as a Medical or Dental Student by the General Medical Council.

Part I. *Dental Mechanics.*—3. This Examination is a practical one, conducted in the Mechanical Laboratory of one of the Dental Hospitals in London.

4. Candidates must give 21 days' notice in writing of their intention to present themselves for the Examination, and at the same time forward certificates :—

(1) Of having been engaged during a period of not less than two years in acquiring a practical familiarity with the details of Dental Mechanics. One year at least of this study must be taken in the Mechanical Department of a recognised Dental Hospital where the arrangements for teaching Dental Mechanics are satisfactory to the Board of Examiners in Dental Surgery. Part or the whole of the rest of the course may be taken as a pupil with a competent dentist provided that time spent as a private pupil shall be at least twice the time required for the corresponding instruction* taken at a Dental School.

(2) Of having attended at a recognised Dental Hospital and School : (*a*) A course of lectures on Dental Mechanics ; (*b*) a course of Practical Dental Mechanics, including the manufacture and adjustment of 6 dentures and 6 crowns.

6. Any candidate referred at this Examination who does not hold a registrable Dental Qualification will be required, before admission to re-examination, to produce a certificate of having received three months further instruction under the conditions specified in Certificate (1) paragraph 4.

Part II. *Dental Metallurgy.*—7. This Examination is conducted by written paper.

8. Candidates must give 21 days' notice in writing of their intention to present themselves for the Examination, and at the same time forward a certificate :—Of having attended at a recognised Dental Hospital and School : (*a*) A course of lectures on Dental Metallurgy ; (*b*) a course of Practical Dental Metallurgy.

9. Any candidate referred at this Examination who does not hold a registrable Dental Qualification will be required, before admission to re-examination, to produce a certificate of having received, subsequently to the date of reference, not less than three months' instruction in Dental Metallurgy in a recognised Dental School.

Part III. (*a*) *General Anatomy and Physiology,* (*b*) *Dental Anatomy and Physiology.*—10. This Examination is partly written and partly oral.

11. Candidates may enter for Section (*a*) only or for Sections (*a*) and (*b*) together on producing the required certificates, but they will not be allowed to proceed with Section (*b*) until they have passed in Section (*a*). In the case of a candidate who enters for both Sections and fails in Section (*a*) the fee paid for admission to Section (*b*) will not be forfeited, but will be credited to the candidate on readmission to examination in that Section. Candidates who enter for both Sections together may pass in Section (*a*) although failing to pass in Section (*b*).

12. Candidates must give 21 days' notice in writing of their intention to present themselves for the whole or for one Section of this examination and at the same time forward certificates :—

(1) For Part III. (*a*). Of having attended at a recognised Medical School : (*a*) Courses of instruction in Anatomy, including special demonstrations on prepared dissections during three terms ; (*b*) a course of dissections to include, if possible, the head and neck, during one term ; (*c*) courses of instruction in Physiology including General Biology, Biochemistry, and Biophysics, during three terms ; (*d*) a course of instruction in Histology.

(2) For Part III. (*b*). Of having attended at a recognised Dental School : (*a*) A course of instruction in Dental Anatomy and Physiology ; (*b*) a separate course of instruction in Dental Histology, including the preparation of Microscopical Sections.

13. A candidate referred at this examination who does not hold a registrable Dental Qualification will be required, before readmission to Section (*a*), to produce a certificate of three months' additional study of Anatomy and Physiology at a recognised Medical School, and will be required before readmission to Section (*b*) to produce a certificate of three months' additional study of Dental Anatomy and Physiology at a recognised Dental School.

14. *Exemptions.*—Candidates who have passed Section I. of the First Professional Examination of the Conjoint Examining Board in England, or who produce evidence of having passed the Examination in Anatomy and Physiology for a degree, or other qualification, in Medicine or Surgery, registrable under the Medical Act of 1886, or for the degree of M.B. or M.D. of a Foreign or Colonial University recognised by the Conjoint Examining Board in England, are not required to pass Section (*a*).

*Second Professional Examination.*—1. The Second Professional Examination is held in February, May or June, and November in each year, and consists of : Part I., General Surgery and Pathology ; Part II., Dental Surgery and Pathology, and Practical Dental Surgery.

2. Candidates who have passed the First Professional Examination at least six months† previously may present themselves for Part I. only on producing the certificates mentioned in paragraph 6 of this section, or they may enter for the whole Examination at one time on producing the certificates mentioned in paragraphs 6 and 10 of this section.

3. Candidates must pass in Part I. before proceeding to Part II.

4. Candidates who enter for the whole Examination at one time may pass in Part I. although failing to pass in Part II. ; but if they fail to pass in Part I. they will not be allowed to proceed with the Practical and Oral Examinations in Part II. In such cases the fee paid for admission to Part II. will not be forfeited, but will be held over until such time as the candidate is readmitted to examination in that Part.

Part I. *General Surgery and Pathology.*—5. This Examination is partly written and partly oral.

* This instruction may be taken prior to the date of passing the Examination in General Education and the Pre-Medical Examination, but will not be counted as part of the required four years of professional study unless taken after passing the Pre-Medical Examination.

† The interval of six months is not required in the case of a colonial or foreign dentist.

6. Candidates must give 21 days' notice in writing of their intention to present themselves for this Examination, and at the same time forward certificates:—

(1) Of having attended at a recognised Medical School: (*a*) A course of instruction‡ in Surgery during two terms; (*b*) a course of instruction in Medicine during two terms; (*c*) a course of instruction in General Pathology (including Bacteriology) during two terms. (2) Of having acted as Surgical Dresser in the Out-patient Department of a recognised Hospital for three months. (3) Of having attended, at a recognised Hospital or Hospitals, the practice of Medicine and Surgery, including clinical lectures, for 12 months. (4) Of being 21 years of age.

7. Any candidate referred at this Examination who does not hold a registrable Dental Qualification will be required, before admission to re-examination, to produce a certificate of such additional study during three months at a recognised Medical School and Hospital as the Teachers of the School may determine.

*Exemptions.*—8. Candidates who are Members of the College or who have passed the Examination in Surgery of the Conjoint Examining Board in England, or who produce evidence of having passed the Examination in Surgery for a Degree, or other Qualification in Medicine or Surgery registrable under the Medical Act of 1886, are not required to pass Part I. of the Second Professional Examination.

Part II. *Dental Surgery and Pathology.*—This Examination is partly written, partly oral, and partly practical. The oral examination is conducted by the use of preparations, casts, drawings, &c. At the practical examination candidates may be examined:—

(*a*) On the treatment of Dental Caries, on the preparation and treatment of teeth by filling with gold or other material, by inlaying or by crowning, and on other operations in Dental Surgery. (Candidates must provide their own instruments.) (*b*) On the treatment of abnormalities of position of the teeth of children. (*c*) On Clinical cases.

10. Candidates must give 21 days' notice in writing of their intention to present themselves for this Examination, and at the same time forward certificates:—

(1) Of having been engaged during four years in the acquirement of professional knowledge subsequently to the date of registration as a Medical or Dental Student, or of having passed the Pre-Medical Examination conducted or recognised by the Conjoint Examining Board in England. (2) Of having attended at a recognised Dental Hospital and School: (*a*) A course of Dental Surgery and Pathology; (*b*) a separate course of Practical Dental Surgery; (*c*) a course of Dental Bacteriology; (*d*) a course of Dental Materia Medica; (*e*) a course of practical instruction in the administration of such Anæsthetics as are in common use in Dental Surgery. (3) Of having attended at a recognised Dental Hospital and School, or in the Dental Department of a recognised General Hospital, the practice of Dental Surgery during two years.

11. Any candidate referred at this Examination who does not hold a registrable Dental Qualification will be required before admission to re-examination to produce a certificate of three months' additional study at a recognised Dental Hospital.

*Fees.*—The fee for the Diploma in Dental Surgery is 20 Guineas.

Synopses of examinations and all further information can be obtained from the Secretary, Examination Hall, Queen-square, London, W.C. 1.

ROYAL COLLEGE OF SURGEONS, EDINBURGH.—Regulations giving a list of Preliminary Examinations recognised for obtaining the Licence in Dental Surgery, as well as of the subjects of the Professional Examinations, may be obtained from Mr. D. L. Eadie, Clerk to the Royal College of Surgeons, at 49, Lauriston-place, Edinburgh. Candidates must produce certificates of having, subsequently to the date of registration, been engaged for four years in professional studies and of three years' instruction in Mechanical Dentistry from a registered dental practitioner, except in the case of previously registered medical practitioners, when two years will be considered sufficient. Candidates must also have attended a course of instruction at a University or in an established school of medicine or in a provincial school specially recognised by the College as qualifying for the Diploma in Surgery. In addition they will be required to have attended in a recognised dental hospital, or with teachers recognised by the College, special courses of lectures and instruction in Anatomy and Physiology (Human and Comparative), Surgery, Pathology, Materia Medica, Dental Histology, and Practical Dental Mechanics and Metallurgy; two years' attendance at a dental hospital or the dental department of a general hospital recognised by the College. Practical instruction in Mechanical Dentistry from a registered Dentist, or in the Mechanical Department of a recognised Dental Hospital and School, for three years. Candidates who have passed the First and Second Examinations for the Triple Qualification will be exempt from the First Dental Examination, and will have the advantage of being admissible either to the Final Dental Examination or to the subsequent Examination for the Triple Qualification, or to both. But the First Dental Examination will not be held as equivalent to the First and Second Triple Examinations, and will admit to the Final Dental Examination only. Candidates who are Licentiates of this College or who may be registered medical practitioners will be required to produce certificates of attendance on the special subjects only and will be examined in these only for the dental diploma. First Professional Examination: The candidate must have attended the required courses. The examination embraces (1) Chemistry and Physics; and (2) Anatomy and Physiology. The fee is £5 5*s.* for the complete examination, and £3 3*s.* is payable for each division. In all cases of rejected candidates the fee for re-entry is £3 3*s.* Second Examination: The candidate must have attended the remaining courses of the curriculum, must produce certificates showing that he is 21 years of age, and must pay a fee of £10 10*s.*, for re-entry £5 5*s.* The examination embraces (1) Surgery and Medicine; and (2) the special subjects of Dental Anatomy and Physiology, Dental Surgery and Pathology, Dental Materia Medica, Dental Mechanics and Dental Metallurgy, with a practical as well as the written and oral examinations in the subjects of Dental and Oral Surgery, Pathology, and Mechanics. The candidate will be tested in the Treatment of Dental Diseases, in Operative Dentistry, the Administration of Anæsthetics, Orthodontics, and in Prosthetic and Mechanical Dentistry. Candidates who claim exemption from the First Dental Examination on the ground of having passed the First and Second Triple Qualification Examinations or other recognised examinations will, before being admitted to the Second Dental Examination, be required to pay the total fee of £15 15*s.* payable for the dental diploma. Candidates applying for copies of Regulations should state date of registration as a dental student. Fees and schedules must be lodged with the Clerk not later than one week before the examination.

Separate Regulations are issued for candidates registered as Dental Students after Jan. 1st, 1923, for whom there is a much more extended course.

*Higher Dental Diploma.*—The College grants a Higher Dental Diploma which is registrable in the Dentists Register as an additional qualification. Every candidate for the Higher Dental Diploma shall produce evidence that he has been engaged in the study or practice of his profession as a Registered Dentist for at least one year subsequent to his having obtained the Licence in Dental Surgery of the College, or a Licence or Qualification in Dental Surgery specially recognised by the College. Particulars as to the examinations can be obtained from Mr. D. L. Eadie, Clerk to the Royal College of Surgeons, 49, Lauriston-place, Edinburgh. The fee payable by Licentiates of the College is £15 15*s.* For all other candidates £21. A fee of £10 10*s.* is retained for examination expenses in the case of referred candidates.

The examination embraces the following branches of Dental Science and practice: Dental Surgery, Anatomy, Pathology and Bacteriology, Prosthesis, Anæsthesia, and Dental Radiology. The examination

‡ These courses of instruction must be attended after the completion of the courses in Anatomy and Physiology.

will be clinical and practical as well as written and oral. Candidates will be expected to show a high degree of knowledge and skill.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.—The regulations as to certificates, curriculum, number, and subjects of examinations, fees, &c., are in effect similar to those of the Royal College of Surgeons of Edinburgh, but embrace Dental Bacteriology. Candidates can enter for the First Examination in three divisions, the first embracing Physics and Chemistry, the second Dental Metallurgy and Dental Mechanics, and the third Anatomy and Physiology. The examination in Dental Mechanics is practical; and there is at the Final Examination an examination in Practical Dentistry conducted in a dental hospital. Copies of regulations, &c., to be obtained from Mr. Walter Hurst, Registrar, Faculty Hall, 242, St. Vincent-street, Glasgow. Candidates applying for Regulations should state date of commencement of curriculum.

ROYAL COLLEGE OF SURGEONS IN IRELAND.—Candidates for the Licence in Dental Surgery, aged at least 21, pass two professional examinations. Before the First Examination the candidate must produce evidence of having attended courses in Theoretical and Practical Chemistry, including Metallurgy and Physics, at a recognised institution; of having been registered as a medical or dental student by the General Medical Council; and of having attended courses of instruction in the following subjects at a recognised school of medicine: (*a*) Anatomy Lectures; (*b*) Dissections with Demonstrations; (*c*) Physiology, including Dental Physiology; (*d*) Practical Physiology and Histology, including Dental Physiology and Histology, Human and Comparative. Before the Final Dental Examination the candidate must have been engaged during a period of two years in acquiring a practical familiarity with the details of Mechanical Dentistry under the instruction of a registered dentist, or under the direction of the superintendent of the Mechanical Department of a recognised Dental Hospital, and have attended, at institutions recognised by the College for the purpose, the following courses of instruction: (*a*) Dental Surgery and Pathology, Orthodontia, and the Materia Medica and Therapeutics applicable to Dental Surgery. Lectures. Two courses. (*b*) Dental Mechanics. Lectures. Two courses. (*c*) Dental Anatomy. Lectures. One course. (*d*) The practice of a Dental Hospital, or of the Dental Department of a General Hospital. Two years. He must also have attended Clinical instruction at a recognised General Hospital during the ordinary teaching sessions (nine months), and have been engaged during four years in the acquirement of professional knowledge subsequently to the date of registration as a medical or dental student. One year's bona-fide apprenticeship with a registered dental practitioner, after being registered as a medical or dental student, may be counted as one of the four years of professional study. In the First Dental Examination candidates will be examined in (A) Physics and Chemistry, including Practical Chemistry and Metallurgy. (B) Anatomy, Physiology, and Histology—General and Dental. All the subjects may be passed at the same time, or they may be passed in two groups (A and B).

In the Final Dental Examination candidates will be examined in General Pathology, Medicine, and Surgery; Dental Surgery, and Dental Pathology, with the Materia Medica and Therapeutics applicable to Dental Surgery; Dental Mechanics and Metallurgy; Orthodontia. Candidates must pass in all the subjects at one examination. The total fee for the Diploma in Dental Surgery is 20 guineas.

UNIVERSITY OF BIRMINGHAM.—The teaching of Dentistry is undertaken by the University acting in association with the Birmingham Dental Hospital and the Birmingham Clinical Board. The instruction at the Dental Hospital is carried out under the direction of the University Dental Clinical Board, so that students may fully qualify themselves for the Dental Diploma (L.D.S.) of this and other universities and licensing bodies. There is a special and well-equipped Dental Museum: The "John Humphreys Odontological Museum." An Entrance Exhibition, value £37 10*s.*, is awarded annually at the commencement of the winter session. The following are the regulations for Degrees in Dentistry:—

1. The degrees conferred by the University are those of Bachelor and Master of Dental Surgery (B.D.S. and M.D.S.). 2. All candidates for these degrees must pass the same Matriculation Examination as that required from candidates for Medical Degrees. 3. The degree of Bachelor of Dental Surgery is not conferred upon any candidate who has not obtained a Licence in Dental Surgery. The candidate is not eligible for the degree until a period of 12 months has elapsed from the passing of his examination for the Licence in Dental Surgery. Of this period at least six months must be spent in the dental department of a general hospital approved by the University. 4. *A.* In addition to the Licence in Dental Surgery the candidate must produce evidence that he has attended the courses required by medical students of the University in the following subjects and passed the Examinations held in the same for Medical and Surgical Degrees: (*a*) Elementary Biology and Organic Chemistry, (*b*) Anatomy and Practical Anatomy, and (*c*) Physiology and Practical Physiology. *B.* That he has passed the class examinations in: (*d*) One Special Course of Lectures on Medicine, (*e*) One Special Course of Lectures on Surgery, and (*f*) Pathology and Bacteriology. *C.* That he has attended courses and passed the class examinations in: (*g*) Dental Histology and Patho-Histology, (*h*) Comparative Dental Anatomy, and (*k*) Dental Surgery and Prosthetic Dentistry. *D.* That he has received instruction in the Clinical Examination of living cases at the dental department of a general hospital for a period of not less than six months. 5. The Final Examination will deal with the subjects in Classes *C* and *D*. 6. On the expiration of 12 months from the date of passing the Examination for the Degree of Bachelor of Dental Surgery, the candidate will be eligible for that of Master of Dental Surgery. 7. For this degree candidates will be required to submit a thesis containing original work, and investigations in some subject connected with Dentistry, which theses shall be submitted to examiners to be nominated by the Dental Advisory Board.

UNIVERSITY OF BRISTOL.—Candidates for the degree of Bachelor of Dental Surgery must be not less than 21 years of age and shall have pursued the courses prescribed by University regulations during not less than four years after passing the first examination in the subjects of Chemistry and Physics, of which three shall have been passed in the University. All candidates for the degree of B.D.S. are required to satisfy the examiners in the several subjects of four examinations. The First Examination: The subjects are Chemistry, Physics, and Biology, and the curriculum extends over one year.* The Third Examination: The subjects are Dental Mechanics, Dental Metallurgy, and Dental Materia Medica, and the candidate shall produce evidence of having served for three years an approved pupilage in Dental Mechanics.† The Second Examination: The subjects are Anatomy, Physiology, and Histology, Dental Anatomy, and Dental Histology. The Final Examination: The subjects are Medicine and Surgery, Dental Surgery (including Prosthetics), Operative Dental Surgery, and Dental Bacteriology. Degree of Master of Dental Surgery: Candidates shall be Bachelors of the University, shall present a Dissertation on some subject of Dental

* Candidates who have passed the Higher School Certificate approved by the Board of Education in these subjects will not be required to sit for the first examination for either the B.D.S. or the L.D.S., and will be regarded as having completed one year of study.

† This pupilage must be taken either in the University laboratories or those of some institution recognised for the purpose by the University.

Surgery to be approved by the Examiners, and pass an examination in Dental Surgery. Diploma in Dental Surgery: Candidates need not be undergraduates, but shall have passed an entrance examination satisfactory to the University before being admitted to any professional examination; the curriculum extends over four years from the date of passing a preliminary science examination in Chemistry and Physics. A three years' pupilage in Mechanical Dentistry is required† and four examinations must be passed, the subjects of which agree with those of the B.D.S. Medicine is not required for the Final Examination. Candidates who are already registered medical practitioners shall be further exempted from study and examination in Physics and Chemistry, Anatomy, Physiology and Histology, Medicine, and General Surgery.

UNIVERSITY OF DURHAM.—Every Dental student must, at the commencement of his studentship, be registered in the manner and under the conditions prescribed for Medical students.

First Examination for the Licence in Dental Surgery: This examination consists of two parts, which may be passed separately. Part 1, Biology, Organic Chemistry. Part 2, Theoretical Dental Mechanics, Dental Metallurgy (theoretical and practical). Second Examination: Anatomy, Physiology (including Biochemistry and Biophysics), Dental Anatomy and Dental Histology. Third Examination: Pathology and Bacteriology, Practical Dental Mechanics, Dental Materia Medica and Therapeutics. Final Examination: Medicine, Surgery, Dental Surgery and Pathology, Orthodontics, Operative Dental Surgery, and Dental Prosthetics, and Anæsthetics.

A candidate before presenting himself for examination is required to furnish certificates of instruction in the following subjects, attended after registration as a dental student at recognised Colleges or Schools: (*a*) Organic Chemistry; (*b*) Elementary Biology‡; (*c*) Human Anatomy, with dissections and demonstrations for three academic terms; (*d*) Physiology, including Biochemistry and Biophysics (with laboratory instruction, including practical Histology) for three academic terms; (*e*) General Pathology (including Bacteriology) for two academic terms; (*f*) Medicine for two academic terms; (*g*) Surgery for two academic terms; (*h*) the practice of a recognised General Hospital or Hospitals of not less than 80 beds, with certified instruction in Clinical Medicine and Clinical Surgery, for four academic terms. The certificates of teaching at General Hospitals must furnish evidence of the student having acted as Medical Clinical Clerk and Surgical Dresser, and of attendance in the Out-patient or Casualty Departments. A certificate of clinical instruction in Venereal Disease is required.

The candidate must have attended at a recognised Dental School courses of instruction in the following special subjects: (*a*) Dental Anatomy and Physiology, human and comparative. The course should comprise a minimum of 20 meetings of the class. (*b*) Practical Dental Histology and Morbid Histology. The course should comprise a minimum of 16 meetings of the class. (*c*) Dental Pathology and Surgery. The course should comprise a minimum of 20 meetings of the class. (*d*) Dental Materia Medica and Therapeutics. The course should comprise a minimum of 16 meetings of the class. (*e*) Dental Metallurgy (with practical work and demonstrations). The course should comprise a minimum of 20 meetings of the class. (*f*) Dental Mechanics (with practical work and demonstrations). The course should comprise a minimum of 20 meetings and 20 demonstrations. (*g*) A course of instruction in the use of Anæsthetics, general and local, employed in Dental Practice. (*h*) A course of instruction in Radiology as applied to Dentistry.

† See previous page.

‡ A student who has diligently attended an approved course of Elementary Biology in a secondary school or other teaching institution recognised by the University may be admitted to a Professional Examination in Elementary Biology immediately after his registration as a dental student.

*Note.*—A candidate must produce a certificate of having administered general anæsthetics on at least ten occasions.

The candidate must have for at least 24 calendar months attended, during the ordinary academic terms, the practice of a recognised Dental Hospital or of the recognised Dental Department of a General Hospital, and have received for not less than 24 calendar months practical instruction in Dental Mechanics.

*Note.*—No portion of such practical instruction which is taken prior to the date of registration shall be reckoned as a portion of the four years of Professional Study required.

Instruction in Dental Mechanics should, if possible, be taken at a recognised Dental Hospital and School. If any part of such instruction be taken by the candidate as a pupil with a registered dentist the time required to be devoted to it shall be at least twice the time required for the corresponding instruction taken at a Dental Hospital and School.

*Degree of Bachelor of Dental Surgery* (*B.D.S.*).—(*a*) For students taking their complete course of instruction in the University. Such students must pass the same matriculation tests as medical students, and the same pre-registration examination in Inorganic Chemistry and Physics. After registration students must spend five years in the University, on attendance on such subjects as Senate, on the recommendation of the Board of the Faculty of Medicine, may from time to time determine. They must attend the practice of the Newcastle-upon-Tyne Dental Hospital for not less than two and a half years. Six months of this time must be devoted to the study of the higher branches of dental science. There are four examinations.

The subjects of the *first* examination are Biology and Organic Chemistry, of the same standard as for medical students; and Dental Mechanics and Metallurgy.

The subjects of the *second* examination are Anatomy, Physiology, Dental Anatomy and Histology.

The subjects of the *third* examination are Pathology and Bacteriology, Dental Materia Medica and Therapeutics, and Practical Dental Mechanics.

The subjects of the *final* examination are Medicine, Surgery, Dental Surgery and Pathology, and Orthodontia and Operative Dental Surgery. In this subject knowledge of a much higher standard, and more advanced practical work, will be required than for the Licence in Dental Surgery.

(*b*) For candidates possessing a Licence in Dental Surgery of a British University. Candidates must study for at least one year in the University. During such year they must (*a*) attend a course of instruction in Pathology and Bacteriology, and (*b*) spend at least six months in the Newcastle-upon-Tyne Dental Hospital in the study and practice of the higher branches of dental science. They must also pass the third and final examinations for the degree of Bachelor of Dental Surgery.

*Degree of Master of Dental Surgery* (*M.D.S.*)—Every candidate for this degree must be a Bachelor of Dental Surgery of the University of not less than two years' standing, and present an essay embodying original work and research in some subject connected with dentistry. They must also perform to the satisfaction of the examiners a piece of special dental work demanding a high degree of skill and experience.

The examinations are held concurrently with the medical examinations, and the fees payable by candidates for the Licence in Dental Surgery are as follows: First Examination, £2 10*s.*; Second Examination, £2 10*s.*; Third Examination, £3 10*s.*; Final Examination, £3 10*s.*; fee for Licence, £3; total, £15. For re-examination: First Examination, £1 10*s.*; Second Examination, £2; Third Examination, £2 (in one part only, £1); Fourth Examination, £2. The practical examinations in dentistry are conducted at the Newcastle Dental Hospital.

UNIVERSITY OF LEEDS.—The degrees in Dental Surgery are Bachelor of Dental Surgery (B.Ch.D.) and Master of Dental Surgery (M.Ch.D.). All candidates for the degree of Bachelor of Dental Surgery shall be required to have passed the Matriculation Examination, to have pursued thereafter approved courses of study for not less than five academic years, two of such years at least having been passed in the University subsequently to the date of passing Parts I. and II. of the First Examination, and to have completed such period of pupilage or hospital attendance, or both, as may be prescribed by the regulations of the University. No candidate will be admitted to the degree who has not attained the age of 21 years on the day of graduation. The Diploma in Dental Surgery (L.D.S.) is awarded to successful candidates after attendance on approved courses extending over not less than four years. The curriculum for the Diploma now includes the study of Biology for the First Examination. The classes in the Department of Dentistry begin on Oct. 1st. The instruction in the Preliminary subjects of Chemistry, Physics, and Biology are given in the main buildings of the University. The classes in the other subjects and the systematic courses in Dental subjects are held in the School of Medicine of the University in Thoresby-place. The clinical instruction is given in the Dental Hospital at the Leeds General Infirmary. Applications for the prospectus should be made to the Academical Sub-Dean of the Faculty of Medicine.

UNIVERSITY OF LIVERPOOL.—The University grants a Licence in Dental Surgery (L.D.S.) and degrees in Dental Surgery (B.D.S. and M.D.S.). The management of the curriculum (lectures, practical and clinical) is in the hands of the University Board of Dental Studies. The courses of systematic instruction are given in the main University buildings, and those in Dental Mechanics, Operative Dental Surgery, &c., are given in the University School Extension (opened 1922), adjoining the Dental Hospital, the laboratory of which is in charge of a skilled dental mechanic under the supervision of the Director of Dental Education. The clinical instruction is given in the Dental Hospital. Students can take the whole curriculum, including Dental Mechanics, at the University School of Dental Surgery. The times of the lectures at the University are arranged to meet the convenience of students, thus allowing the maximum time for attendance upon Dental Hospital practice. Fees: The fees for the complete courses, including Pupilage and Hospital Practice, are as follows: Degree of B.D.S., £250; M.D.S. (by research, £32; by examination, £27); L.D.S. (Liverpool), £198. Further information may be had from the Director of Dental Education, Prof. W. H. Gilmour.

In order to be admitted to the Bachelor's Degree in Dental Surgery a student must normally, after registration as an Internal Student, have—(1) Attended prescribed courses of study for five years at one or more Schools of the University. (2) Passed the following examinations:—(*a*) First Examination: *Part A:* (i.) Chemistry, (ii.) Physics, (iii.) Biology (Zoology and Botany); *Part B:* (iv.) Dental Metallurgy. Candidates may take Parts A and B separately. (*b*) Second Examination: *Part A* (i.) Anatomy, (ii.) Dental Anatomy, Dental Physiology, and Dental Histology; *Part B:* (iii.) Physiology; *Part C:* (iv.) Dental Mechanics. Candidates may take Part A separately but must take Parts B and C together. Third Examination: *Part A:* (i.) Elementary Bacteriology, (ii.) Clinical Chemistry, (iii.) General Pathology; *Part B:* (iv.) Dental Materia Medica, (v.) Dental Mechanics and Dental Prosthetics. Candidates may take Parts A and B separately. Students who have received not less than two years' instruction in Dental Mechanics previous to Nov. 30th, 1922, with a Dentist registered under the provisions of the Dentists Act (1921) and who have passed a recognised examination in preliminary education may, on application, be registered as students for the Licence under certain conditions.

UNIVERSITY OF LONDON.—The curriculum for the degree of Bachelor of Dental Surgery covers five years from Matriculation. The Regulations for Internal and External Students may be obtained post-free on application to the Principal Officer, at the University.

UNIVERSITY OF MANCHESTER.—In the University of Manchester the Dental Department forms an integral part of the Faculty of Medicine. This contains a series of laboratories, lecture rooms, and museums which will bear comparison with those of any other school in the kingdom, and the fullest opportunities for study are offered to students preparing for any of the professional examinations. Instruction adapted to the requirements of students preparing for the B.D.S. Degree and the Dental Diplomas of the University, the Royal College of Surgeons of England, and of other licensing bodies is given throughout the session both at the University and at the Dental Hospital of Manchester adjoining the University. The required general hospital practice is taken at the Manchester Royal Infirmary. Women students are admitted to the classes in the Dental Department, and for them common rooms are provided. The composition fee for candidates for the University degree of Bachelor of Dental Surgery is 93 guineas, payable in three equal yearly instalments. The composition fee for candidates for the University Diploma in Dentistry is 83 guineas, payable in three equal yearly instalments. The composition fee for candidates for the L.D.S. of England is 93 guineas, payable in three equal yearly instalments. Students who have already served their apprenticeship with a private practitioner, and who propose to complete the final portion of their attendance at the University and at an approved dental hospital, will be required to pay the composition fee in two equal instalments at the commencement of the first and second years of studentship. The composition fee does not include the hospital fees, the examination fees, nor the fee for the conferment of the degree or the diploma.

UNIVERSITY OF SHEFFIELD.—*Degree of Bachelor of Dental Surgery.*—A candidate must have attained the age of 22 years on the day of graduation and have pursued the courses of study required by the University regulations during a period of not less than five and a half years subsequent to matriculation and the passing of the further examination in Chemistry and Physics, three of such years at least having been passed in the University, one at least being subsequent to the passing of the First Examination.

First Examination: The subject of the examination is Biology. Candidates must have attended a course of instruction for one year after matriculation and the passing of the further examination in Chemistry and Physics. Second Examination: The subjects of the examination are Anatomy, Physiology, Dental Anatomy, Physiology and Histology; Dental Mechanics, Dental Metallurgy. Final Examination: The subjects of the examination are: Part I., Pathology and Bacteriology; Part II., Medicine and Surgery, Dental Surgery, including Materia Medica and Therapeutics. Candidates for Part II. must have completed five and a half years of professional study.

*Degree of Master of Dental Surgery.*—Candidates must have passed the examination for the degree of B.D.S. at least one year previously and before admission to the examination must have held for not less than six months a dental appointment in a hospital affording full opportunity for the study of Dental Surgery. Candidates shall not be required to but may present a thesis embodying observations in some subject approved by the Faculty and a candidate whose thesis is of exceptional merit may be exempted from any part of the examination.

*Diploma of Licentiate in Dental Surgery.*—A candidate must have attained the age of 21 years on the day upon which he is to receive the diploma, and have pursued the courses of study required by the

University regulations during a period of not less than four years subsequently to passing the preliminary examination and the passing of the further examination in Chemistry and Physics. Two years must be passed in the University, one at least being subsequent to the passing of the First Examination.

First Examination: The subject of the examination is Biology. Candidates must have attended a course of instruction for one year. Second Examination: The subjects of the examination are Anatomy and Physiology, Dental Anatomy and Physiology, Dental Mechanics, Dental Metallurgy. Final Examination: The subjects of the examination are: Part I., Pathology and Bacteriology; Part II., Medicine and Surgery, Dental Surgery, including Materia Medica and Therapeutics. Candidates for Part II. must have completed the fourth year of professional study.

The Dental Composition Fee is £25 for each year of the course. In addition a fee of £50 is payable each year the student receives instruction in Mechanical Dentistry in the Dental Department.

NATIONAL UNIVERSITY OF IRELAND.*—At this University there is a Diploma in Public Health, a B.Sc. in Public Health, and a D.Sc. in Public Health. The Diploma may be granted to matriculated or non-matriculated students of the University who shall have completed approved courses of study and shall have passed the prescribed examinations, provided that it shall not be granted except to a registered medical practitioner. Candidates may present themselves for the examination after an interval of not less than 12 months from the time of obtaining a registrable qualification. The curriculum extends over a period of not less than nine calendar months. Every candidate must produce a certificate that he has attended practical instruction in a laboratory, approved by the University, in Chemistry, Bacteriology, and the Pathology of the diseases of animals transmissible to man. The examination consists of two parts, which may be passed separately or together. Part I. comprises the following subjects: Chemistry, Meteorology and Climatology, and Sanitary Engineering and Architecture. Part II. comprises the following subjects: Bacteriology, Hygiene, Sanitary Law, and Vital Statistics. The examination in each part will be oral and practical as well as written.

For the B.Sc. in Public Health a candidate shall not be admitted unless he (*a*) shall have received the degrees of M.B., B.Ch., and B.A.O. at least one year previously; (*b*) shall have pursued an approved course of study in the Faculty of Medicine; and (*c*) shall have passed the prescribed examination. In addition to D.P.H. course the candidate will be required to take up (1) a Special Course of Pathology; (2) Bacteriology; and (3) Advanced Course in Hygiene. Each of these courses lasts three months.

QUEEN'S UNIVERSITY OF BELFAST.—The following degrees and diplomas are now conferred: Licentiate in Dental Surgery, Bachelor of Dental Surgery, and Master of Dental Surgery. Lecturers have been appointed in Dental Surgery, Dental Mechanics, Dental Metallurgy and Materia Medica, and Orthodontia.

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## TEACHING INSTITUTIONS IN DENTISTRY.

Of teaching institutions those connected with the several universities have now been described in some detail, but in addition to these there are a number of institutions which offer facilities to dental students and which are here set out under their localities.

### LONDON.

*Royal Dental Hospital of London, School of Dental Surgery*, Leicester-square.—A school of the University of London, and women are now admitted as students and are eligible for all hospital appointments and school prizes. The school provides the special dental education required by the Royal College of Surgeons for the Licence in Dental Surgery. The general part of the curriculum may be taken at any general hospital. The hospital is open from 9 A.M. to 5 P.M., there being one staff for the morning and another for the afternoon of each day. Pupils are received for the training in dental mechanics recognised by the curriculum. The instructors at the commencement of each session give a course of lectures on Operative Dental Surgery. The five house surgeoncies are held for six months each and are open to all qualified students. The lecturers, in addition to their lectures, give special demonstrations on the Microscopy of Dental Anatomy and Dental Surgery. The lecturer on Dental Mechanics also gives practical demonstrations in the laboratory. There is an Entrance Scholarship in Chemistry and Physics of the value of £50. One Entrance Scholarship in Dental Mechanics and Metallurgy, value £25, open to pupils of the Hospital only. One Entrance Scholarship of £25 in Dental Mechanics, open to pupils of private practitioners. The Saunders Scholarship of £20 and Saunders Prize of £5 awarded to second year students. The Storer Bennett Research Scholarship for Scientific Research in any branch of Dental Surgery, value £50, is awarded triennially. The Alfred Woodhouse Scholarship of £35 and the Robert Woodhouse Prize of £10 for Practical Dental Surgery. Prizes and certificates are awarded by the lecturers for the best examinations in the subjects of their respective courses at the end of the summer and winter sessions. Fee for two years' hospital practice required by the curriculum, including lectures, £70 in one payment, or £73 10*s.* in two yearly instalments. The curriculum requires two years to be passed at a General Hospital; the fee for this is about £68 5*s.* Both hospitals can be attended simultaneously. For the lectures in Chemistry and Physics for the Preliminary Science Examination £13 13*s.* The fee for the instruction in Dental Mechanics and the two years' hospital practice required by the curriculum is £200 if paid in one instalment, or 200 guineas if paid in three equal instalments. The fee for tuition in Dental Mechanics is £70 per annum; for one year's hospital practice £28. The Winter Session opens on Oct. 1st.

*University College Hospital Dental School*, corner of Great Portland and Devonshire-streets, W.—This Hospital and School has recently been thoroughly reorganised, and is now fully equipped with all the most modern appliances. Students are entered as students of University College Hospital, and, as such, attend the classes of Anatomy and Physiology in University College, which is a few minutes' walk from the Dental Department in Great Portland-street, hitherto known as the National Dental Hospital, the first Dental School to admit Women Students. Practical courses to comply with the R.C.S. curriculum are held. Clinical Lectures and Demonstrations are given, and each student on entering passes through a preliminary course under a demonstrator. Composition Fees: Comprising two years' Dental Mechanics, Anatomy, Physiology; two years' Hospital Practice, Medicine, Surgery, and Dental Lectures (four years): 1st year, £56; 2nd year, £84; 3rd year, £64; 4th year, £32; total, £236. Medical Men: Two years' Mechanics, and Dental Practice and Lectures: 1st year, £102 6*s.*; 2nd year, £70; total, £172 6*s.* For a six years' course of medical and dental education comprising the whole of the dental curriculum and the curriculum for the M.R.C.S., L.R.C.P. diplomas: 1st year, £91; 2nd year, £70; 3rd year, £73; 4th year, £60; 5th year, £73; 6th year, £49; total, £416, in six instalments payable in advance.

*Guy's Hospital.*—The work of the Dental Department begins daily at 9 A.M. both in the extraction rooms and in the conservation room. The Extraction Rooms: There is ample accommodation for ordinary extractions and anæsthetic extractions, together with waiting- and retiring-rooms. Patients are admitted between 8.45 and 9.30 A.M., and are seen by the dental surgeon for the day, the staff demonstrator, the dental house surgeon, and the dressers The Conservation Room is open from 9 A.M. till 5 P.M.

* No returns.

It has a floor space of over 6000 square feet, and affords accommodation for about 100 dental chairs, with the necessary equipment of the most modern type, for the use of the Dressers, who, under the supervision of the Staff, perform the various operations of Dental Surgery. The members of the staff attend every morning and afternoon to give demonstrations and otherwise assist students in their work in the Conservation Room and Prosthetic Laboratory. The Probationers' Laboratory is supervised by three of the staff demonstrators, and instruction is given in operative dentistry on a "mannikin" to students during their first three months of clinical study. Students in Dental Prosthetics are received, and a graded, systematic, and full course of instruction, extending over two years, is carried out under the supervision of the Director of the Prosthetic Laboratory, assisted by two demonstrators and five mechanics. Dental students have the opportunity of attending at this hospital the whole course of instruction required by the examining board for the B.D.S. Lond. or L.D.S. Eng.—viz., the complete course in dental prosthetics, the special lectures and practice of the Dental Department, and the general lectures and practice of the Medical School. The fees for these two courses may be paid separately or together, or they may be combined with the fees required to be paid for the course for a medical diploma. Students who enter for a medical as well as a dental diploma are allowed to pursue their study of Dentistry during any period of their medical course most convenient to themselves without further charge. Two Entrance Scholarships are awarded in July of each year, a War Memorial Scholarship in Arts of the annual value of £40 for four years; and a Science Scholarship of the value of £40 per annum for not more than four years. Prizes of the aggregate value of £40 are awarded for general proficiency and for skill in Operative Dentistry. The Newland-Pedley Gold Medal for Operative Dentistry is also awarded annually. Dental students are eligible for admission to the Residential College and enjoy the privileges of students in the Medical School. Application should be made to the Dean of the Medical School.

Appointments: All appointments are made according to the merits of the candidates, as determined by a committee of the Dental Staff. Eighteen house surgeons, 15 assistant house surgeons, and 15 clinical assistants, and four student demonstrators of Dental Histology are appointed annually. The following appointments are held by students: Full surgeon's dresser, assistant surgeon's dresser, orthodontia dresser, casualty dresser, clerk to the anæsthetist, dresser in the gas extraction and ordinary extraction rooms, and probationary dresser.

*London Hospital.*—This school is a part of the London Hospital and Medical College, and is fully equipped on the most modern lines and with the latest appliances. It provides a complete curriculum in all subjects for the B.D.S. Degree and for the L.D.S. Diploma, and is admirably adapted for the purpose of teaching. The Conservation Room is well lighted and ventilated and fitted with pump chairs of the latest pattern; the fountain spittoons at many of the chairs have been specially designed. Each spittoon has attached to it a saliva ejector, hot and cold water, compressed air, gas and electric current, also a swing bracket to carry the students' cabinet. Electric sterilisers are supplied in each department and motor engines where required. The School possesses in addition to the Theatres, Laboratories and Museums in the College, a special Museum of Dental Anatomy and Surgery, Operative Dentistry, Prosthetic and Extraction Rooms, and Laboratories for Practical Dental Metallurgy and Dental Prosthesis. The extension of the school will be undertaken during the ensuing session. A systematic course of instruction in Dental Prosthesis is arranged for pupils. The up-to-date Laboratory contains every modern apparatus and is in charge of a skilled curator and his assistants. Connected with the Medical College and Dental School are a Library, Athenæum, Clubs' Union, Dining Hall with moderate tariff, Students' Hostel, and an Athletic Ground. For full particulars as to Scholarships and Prizes, fees and course of study advised, apply to the Dean, Prof. William Wright, who will be glad to make arrangements for anyone wishing to see the Dental School and Medical College.

*London (Royal Free Hospital) School of Medicine for Women.*—Full courses are arranged for women students, in conjunction with the Royal Dental Hospital, Leicester-square, for the study of dentistry, and in preparation for the B.D.S. Degree of the University of London and the Licence in Dental Surgery of the Royal College of Surgeons of England, at the London (Royal Free Hospital) School of Medicine for Women.

## PROVINCIAL.

*Birmingham Dental Hospital*, Great Charles-street.—Dean: Mr. W. T. Madin. The Dental Hospital was founded in 1858, and was recognised by the Royal College of Surgeons in 1880 for the teaching of Dental Students. Having an annual attendance of about 21,000 patients, it affords every advantage for students about to enter the profession to acquire a thorough practical knowledge, as required by the Dental Council. The present Hospital was opened on July 6th, 1905. It has accommodation for 50 students. The equipment is in accordance with the most modern requirements for the efficient teaching and practice of Dental Surgery. The operations performed annually average 41,000, including 9000 gold and other fillings, and many cases of crowns, bridges, porcelain inlays, and regulations. By arrangements with the Birmingham University and with the General and Queen's Hospitals the entire course of Lectures, Hospital Practice, &c., may be completed for an inclusive fee of £144 4*s.* 6*d.*, or including Mechanical Pupilage, £255 15*s.* 9*d.*, inclusive of Examination fees for L.D.S. Birm. The instruments and materials necessary for Hospital Practice cost about £45. The Composition Fee for the courses required for the L.D.S. of the University, or any of the Corporations alone, is £75, payable in two annual instalments at the commencement of the first and second years; that for the courses required for the L.D.S. and the Degree in Dentistry of the University is £93 15*s.*; that for the L.D.S. in combination with the M.R.C.S. and L.R.C.P. is £115; and that for the M.B., Ch.B., and B.D.S. is £120. All of these composition fees are payable in two annual instalments at the commencement of the first and second years. Each of these fees covers the cost of the courses given at the University for the qualifications indicated, but does not include fees for Hospital teaching, nor Pre-Dental year Chemistry and Physics. For two years' dental hospital practice the fee is £26 5*s.*, payable in two instalments of £13 2*s.* 6*d.* each at the commencement of the first and second (hospital) years respectively. For two years' mechanical pupilage, £111 11*s.* 3*d.*, which may be paid in two annual instalments of £65 12*s.* 6*d.* and £45 18*s.* 9*d.* respectively; mechanical pupils may join for a probationary period of one month, fee £6 11*s.* 3*d.*, which is deducted upon payment of the full amount. For general surgical hospital practice, lectures, and demonstrations: Surgery, two winters, £13 2*s.* 6*d.* One Entrance Scholarship is offered annually of the value of £37 10*s.* It is awarded to the student who, entering for the Dental Degree of the University in October, or having entered not earlier than the previous April, shall pass the best examination in the subjects studied during his apprenticeship. Candidates must be under the age of 21 years. Application for admission, together with a certificate of birth, must be sent to the Dean of the Medical Faculty, Mr. William F. Haslam, on or before Oct. 15th.

*Leeds University School of Dentistry.*—The School of Dentistry is adequately equipped to provide for the complete training of the dental student. The School forms a part of the Leeds School of Medicine, whilst the instruction in clinical and mechanical dentistry is carried out in the Dental Hospital at the General

Infirmary. The courses of study are mainly designed to meet the requirements of the B.Ch.D. and L.D.S. Leeds, but every opportunity is afforded to students preparing for the degrees or diplomas of other licensing bodies. Full-time demonstrators give the instruction in clinical dental surgery and prosthetic dentistry, which is carried out under the supervision and direction of members of the Honorary Staff, two of whom are in attendance each day. Special facilities are provided for instruction in Orthodontia and Dental Radiography. Prizes are offered for competition to pupils and students in their respective years of study. Communications should be addressed to the Warden, School of Dentistry, The University, Leeds, from whom a prospectus may be obtained.

*Dental Hospital of Manchester.*—This hospital is in association for teaching purposes with the University of Manchester and the Royal Infirmary, and is in the centre of a very large population. Courses of study are provided to meet the requirements of the various examining bodies, including those of the University of Manchester for the qualifications L.D.S. and B.D.S., and the L.D.S. of the Royal College of Surgeons of England. Clinical instruction is given in Dental Prosthetics, Operative Dentistry, Diagnosis and Extraction, Orthodontics, Dental Surgery, Radiography, and Anæsthetics by specially appointed Clinical Teachers.

For the whole course of hospital instruction for the L.D.S. (including two years' mechanical training) the fee is £131 5*s*., paid in instalments. For the two years' Operative Course only, £26 5*s*., paid in two instalments. For the whole course of hospital instruction for the B.D.S. degree (including mechanical training), £168, paid in instalments. Additional practice in Dental Mechanics may be taken by pupils who have already received their mechanical training elsewhere, at a fee of £36 15*s*. for six months. All the courses of instruction are open to women students. Copies of the Prospectus will be forwarded on application to Mr. J. Hilditch Mathews, Dean.

*Newcastle-upon-Tyne Dental Hospital and School.*—This hospital is centrally situated (within five minutes of the various colleges, infirmary, and railway station); the rooms are well lighted and thoroughly equipped for carrying on the work. Dental surgeons and an anæsthetist attend each morning. A tutorial dental surgeon and a prosthetic tutor is also in attendance. The Composition Fee for the special Dental Lectures and Dental Hospital Practice is £60 4*s*. if paid in one sum, or £62 6*s*. if paid in two instalments of £31 3*s*. The Composition Fee for the Lectures at the Colleges of Medicine and Science is £57 10*s*.; in addition to this there is a library and an athletic fee. The fee for General Hospital Practice at the Royal Victoria Infirmary, Newcastle-upon-Tyne, is £23 2*s*. Medals and Certificates of Merit are granted to students showing certain standards of proficiency in the various classes at the Dental School. The prospectus of the Dental Hospital and School, containing full information, may be obtained from either Mr. J. T. Jameson, 12, Windsor-crescent, Newcastle-upon-Tyne, Dean, or Mr. James Coltman, 13, Ellison-place, Newcastle-upon-Tyne, Vice-Dean.

*Devon and Exeter Dental Hospital*, 24, Southernhay West, Exeter.—Established 1880.—The hospital is open on Mondays, Tuesdays, Wednesdays, Thursdays, Fridays, and Saturdays, and patients are admitted between the hours of 9.30 and 11 A.M. Students attend the practice of the hospital under the control of the medical officers. Honorary treasurer, Mr. J. M. Ackland; secretary, Mr. Albert G. Littlejohn.

## SCOTLAND.

*The Incorporated Edinburgh Dental Hospital and School.*—The Edinburgh Dental Hospital and School is located in spacious and well-equipped buildings at 30, 31, and 32, Chambers-street, and offers special advantages to dental students. The General Courses required for the Dental Diploma may be taken in the Medical School of the Royal Colleges of Physicians and Surgeons or in the University schools. The general hospital attendance and clinical instruction are taken at the Royal Infirmary. The University, Medical Schools, and Royal Infirmary are within three minutes' walk of the Dental Hospital. The special courses are taken in the hospital. The Dental Hospital practice, extending over two years, affords a student ample opportunity for a full acquaintance with every branch of dentistry. The hospital admits a limited number of indentured pupils. They receive their instruction in Mechanical Dentistry concurrently with the general and special courses. A premium of 60 guineas is payable with each such pupil. The practice and lectures of the hospital are recognised by, and qualify for, all the Licensing Boards. The cost of the hospital outfit of instruments is included in the Dental Hospital fee of £42. The minimum cost of classes and Diploma for the whole course of dental instruction amounts to £118 16*s*. Those students who desire to take a Medical and Surgical Diploma in addition to the L.D.S. have in this school admirable facilities for so doing. The triple qualification of the Royal College of Physicians and Surgeons of Edinburgh and the Royal Faculty of Physicians and Surgeons of Glasgow is recommended. The minimum cost of Professional Education, the Triple Qualification, and the Licence in Dental Surgery amounts to £197 3*s*. 6*d*. The Higher Dental Diploma (H.D.D.) of the Royal College of Surgeons affords an opportunity of obtaining a higher qualification subsequent to registration. The Prospectus, with full information, may be obtained by application to the Dean or the Assistant Secretary.

*Incorporated Glasgow Dental Hospital*, 158, Renfrew-street and 15, Dalhousie-street, Glasgow.—The School is open to Men and Women Students, and Lectures are given on Dental Surgery, Operative Dental Surgery, Orthodontia, Dental Anatomy and Physiology, Pathology, Dental Histology, Dental Mechanics, Crown and Bridge work, Dental Metallurgy, Dental Bacteriology, and Anæsthetics. A new Radiography department has been added. Lectures on general subjects required for Dentistry may be taken at the University or at one of the extramural schools where special provision is made for Dental Students. Composition fee for two years' Hospital Practice and Lectures special to Dentistry, £50 on entry, or in two instalments of £31 10*s*. and £21. A new mechanical laboratory with bench accommodation for 60 pupils and fully equipped with the most modern appliances for teaching practical dental mechanics has recently been added. Fee for two years' tuition, £63, or in two instalments. Full information may be had on application to the Dean.

*Glasgow Royal Infirmary* (Dental Department).—Mr. W. R. Taylor attends at the Royal Infirmary at 9 A.M. on Wednesdays and other days as arranged. The following course in the curriculum can be taken at St. Mungo's College: Anatomy, six months; Practical Anatomy, nine months; Physiology, six months; Chemistry, six months; Practical Chemistry with Metallurgy, three months; Surgery, six months; Medicine, six months; Materia Medica, three months; Clinical Surgery, six months; Dental Surgery, six months, and attendance for two years on the dental department of the hospital.

## IRELAND.

*Incorporated Dental Hospital of Ireland*, Lincoln-place, Dublin.—All Dental Students who have passed their First Dental Examination in the Royal College of Surgeons in Ireland (or an equivalent examination or examinations) are admissible to the Clinical Instruction of the Hospital. In addition to Clinical Instruction and Special Demonstrations, courses of lectures are given at the hospital on Dental Surgery and Pathology, Mechanical Dentistry, the Administration of Anæsthetics, Orthodontia, Dental Anatomy, and Dental Materia Medica, and instruction in Anæsthetics. Fees: Hospital Practice (each year), £18 18*s*.; Lectures, £5 5*s*. The course in practical Dental Mechanics can be taken in the Hospital Laboratory. Further particulars can be obtained from the Dean.

# Reviews and Notices of Books.

## DISEASES OF MIDDLE LIFE.

The Prevention, Recognition, and Treatment of the Morbid Processes of Special Significance in this Critical Life Period. Comprising 22 original articles by various eminent authorities. Edited by FRANK A. CRAIG, M.D., Associate Director of the Clinical and Sociological Department of the Henry Phipps Institute of the University of Pennsylvania. Philadelphia: F. A. Davis Company. In two volumes. Pp. 1871. $15.

ATTENTION is more and more being directed to the early stage of many diseases and to the best means of preventing their more serious development. We are often reminded that middle life is the danger period for a great variety of functional and organic breakdowns. The aim of the monographs in these two readable volumes is to assist the practitioner to detect and to treat the early departures from health in middle life.

It is difficult to deal comprehensively with the therapeutic problems involved. There is, for example, the systematic treatment of incipient and chronic disease at health resorts and spas, a large section of the habitual visitors being middle-aged invalids. To this branch of therapeutics only occasional reference is made in these volumes. We select a few examples of the broad and helpful spirit in which the more important sections are discussed. Diet is excellently dealt with by Dr. C. B. Farr, of Akron, Ohio. He calls attention to the diet-requirements in middle life, and refers to the plus or minus basal metabolism of some middle-age disorders, and to the small demand for extra calories in some occupations, such as 44 for a physician or tailor, as against 378 for a man sawing wood. The view of this authority that there is little real proof of intestinal auto-intoxication is supported by another writer in this work, but contradicted by a third. There is a timely and suggestive account of the liabilities and dangers of hypernutrition and of subnutrition. In the section on occupation, Prof. E. R. Hayhurst (Ohio State University) asserts the principle that producers become dependents only by mishap, and that debility-dependence ought not to begin until well over 60. He points out that convalescence can be much expedited by graduated activity of a kind interesting to the patient. The normal temperature for work-rooms, 68° F. for sedentary occupations and downwards, is higher than that prescribed by English authorities, but the prime importance of adequate cooling of the body is not disputed. Prof. J. E. Talley (University of Pennsylvania) gives a more favourable prognosis for disease of the heart in middle life than was current a few years ago. For example, he states that extra-systoles in the third and fourth decades, from which many medical men suffer, usually disappear, or anyhow diminish, in the fifth decade, if the digestion is attended to. Paroxysmal tachycardia coming on in middle life is not so very serious; and cases of auricular flutter, associated with arteriosclerosis, in later life often do fairly well. Again, auricular fibrillation may go on for years, the prognosis depending on the reaction to digitalis. Quinidine, in the author's experience, abolishes fibrillation in 50 per cent. of the cases. He accepts the general view that the prognosis of valvular disease depends on the condition of the myocardium. The value of spirometer measurements in the prognosis of heart affections is emphasised. As showing the prevalence of these affections, it is stated that there are 34 special cardiac clinics in New York, and need for more convalescent beds for "potential cardiac" cases.

Prof. G. M. Piersol (Pennsylvania University) gives an admirable account of the progressive symptomatology of hypertension, following Osler, Adami, Janeway, and others in considering this common disturbance of middle age as antecedent to sclerosis and due to habitual arteriolar spasm. Arteriolar spasm, increased peripheral resistance, increased arterial pressure, hypertrophy of the left ventricle, and myocardial failure form an obvious morbid sequence. The author seems to adopt the view that this "compensation" is conservative, and essential to maintain the circulation. On the other hand, it might be claimed that, if the chain of causation is correctly stated, any method of treatment, such as venesection or warm bathing, that relieves peripheral spasm, will be more truly conservative. Dr. O. H. P. Pepper, in a valuable article on Diseases of the Kidney, remarks that, whilst insurance statistics show that the albuminuria of adolescents does not lead to nephritis in later years, the albuminuria which develops in middle life is a sure sign of kidney disease. When the excretory renal function is reduced, as in middle life, its estimation becomes a matter of importance. The author discusses the signs and symptoms of renal insufficiency and the tests by which it may be detected, concluding that the response of the kidney to water, in minimal or excess quantities, affords a better criterion in chronic nephritis than phenol-sulphonephthalein. These two methods, with the determination of the blood-urea nitrogen, are the three tests of renal function most useful in middle age. Chronic nephritis without œdema is, in the writer's belief, increasing in frequency in middle age. Diabetes mellitus, according to Dr. H. K. Mohler, is becoming more common in America. He claims that Allen's principles of diet have prolonged the life of the adult diabetic by three years. A short section on insulin was added after the book was written.

In a section on Diseases of the Respiratory Tract, the editor expresses an interesting warning. Forced breathing, he thinks, may activate an incipient or dormant tuberculosis, and there is no advantage in increasing the air capacity of healthy lungs excepting in cases of faulty development or improper breathing, or for special requirements like singing or running. Again, in middle-aged persons with fibrous tuberculosis fresh air may cause dangerous chilling, but with care the majority of such cases will be able to "play a minor part in workaday life," although only a few can follow "the abnormal life of the average individual." Dr. Chandler Walker (Harvard Medical School), dealing with bronchial asthma, claims better results from protein therapy than are usually claimed in this country. As to "colds," he considers that they invariably signify lowered physical resistance, too many nasal operations are performed in America, and too much mucous membrane removed. Autogenous vaccines are praised.

In writing on the Gastric Disturbances of Middle Life, Prof. Julius Friedenwald and Dr. T. H. Morrison (both of the University of Maryland) throw out many arresting suggestions not all of which will be accepted. In their experience gastric neuroses form more than half the stomach cases. These are commonest in middle life, often occur in robust subjects, and are sometimes unexpectedly sudden in their onset, like cancer. The old observation of Hutchinson is confirmed, that secondary gastric symptoms are present in the great majority (80 per cent.) of early cases of pulmonary tuberculosis. The progressive sclerotic degeneration of the secretory structure, first demonstrated by Fenwick, probably accounts for the diminution of motility and secretion and frequent dyspepsia in later life, and the achylia gastrica of many elderly persons. Dr. Anthony Basler (Christ's, N.J.), from his experience of chronic intestinal cases, regards the colon as the chief cause of disease in middle life, but is strongly opposed to surgical intervention, regarding operation upon the colon as unwarrantable unless bona fide obstruction is present. He makes an exception for chronic colitis with follicular ulceration, in which appendicostomy and trans-irrigation of the large bowel give, at least for a time, good results. Much of the current treatment of colon disorders is, in his view, based on rash assumptions from laboratory findings. "The germicidal effect of drugs in the

intestinal canal is an ostrich proposition," and the claims made for colonic lavage are, in his opinion, unjustified. The metabolic disturbances of infective arthritis are described by Prof. J. A. Lichty (University of Pittsburgh) as operating, like traumatism, to furnish a prepared ground for infective processes. The hypothesis agrees well with the conception of a complex causation for these diseases, and indeed for all disease. Lichty ranges himself with those who deny that the alimentary canal is a common source of infection. Excepting in the case of gonorrhœal arthritis, the use of vaccines has little or no scientific basis. Baths and waters are advocated, the excessive use of heat and undue local reactions being avoided.

The book abounds in fresh and practical observations, and will be of interest to all practitioners who are in touch with the problems of health in middle life. The bibliographies following many of the sections give it an added value. A duplication of paragraphs in one of the articles in the second volume will, no doubt, be corrected in a second edition.

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COLLECTED PAPERS.

*London School of Tropical Medicine: Department of Helminthology.* Collected Papers. Part 5. 1924. Nos. L.–LXVI.

THIS collection of 17 scientific papers, the fifth volume of the series to be issued within the last two years, serves as an index of the activities of the Helminthological Department of the London School of Tropical Medicine, under the directorship of Prof. R. T. Leiper. The volume includes a paper by H. H. Scott on an experimental study of the life-histories of *Hymenolepis fraterna*, Stiles, 1906, and *Hymenolepis longior*, Baylis, 1922, in the mouse, and a number of studies on nematodes of veterinary interest by T. W. M. Cameron and T. Goodey. M. Khalil writes upon the morphology of *Schistosoma bovis*, and Prof. R. T. Leiper contributes an address on the Present-day Teachings on Helminthology in Relation to Public Health.

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OTO-RHINO-LARYNGOLOGY.

*The Mechanism of the Cochlea: A Restatement of the Resonance Theory of Hearing.* By GEORGE WILKINSON, M.B. Camb., F.R.C.S. Eng.; and ALBERT A. GRAY, M.D. Glasg., F.R.S.E. London: Macmillan and Co. 1924. Pp. 253. 12*s.* 6*d.*

THERE are two principal theories of the method whereby the perception of sound, especially of musical sounds, is translated into consciousness, which are called respectively the "resonance" and the "telephone" theories. The resonance theory was originally propounded by von Helmholtz in 1863, and supposes that sounds of different pitch stimulate different portions of the organ of Corti—that is, that sounds are analysed in the cochlea. The telephone theory, put forward in 1886 by Rutherford, premises that the basilar membrane follows the vibrations as a whole, and transmits them as received to the auditory centre in the brain, which performs the task of analysing compound tones and of distinguishing pitch. The resonance theory has remained the most generally accepted, but certain difficulties have prevented its acceptance as a complete explanation. The most important of these difficulties are that the fibres of the basilar membrane are bound together and cannot vibrate separately for tones of every different pitch, and that the differentiation as to length of the basilar fibres is quite inadequate to account for a tuning of these fibres for the whole range of 10 to 11 octaves comprised in the audible scale. The first objection has been met by Dr. Gray's theory of "maximum stimulation" on the analogy of a similar phenomenon in tactile sensation; when a point is pressed on to the skin it is still felt only as a point although, with firm pressure, many surrounding nerve-endings are affected, so, it is held, the nerve-impulses from neighbouring basilar fibres are repressed and only the vibration of the fibre at the maximum point of vibration affects consciousness. Mr. Wilkinson's theory of the fluid load on the fibres of the basilar membrane is designed to meet the second difficulty. The vibration period of a stretched string depends on three factors—length, tension, and mass per unit length, or load. The length and tension of the basilar fibres are known to be differentiated progressively, and Mr. Wilkinson's theory adds that the load on any fibre is the columns of endolymph between it and the fenestræ, and that this is sufficient to allow of a tuning of the fibres to the 10 or 11 octaves required. He has constructed a very ingenious model which gives results that, though necessarily rough, bear out his contention. A full description of this, and of the mathematical formulæ involved, will be found in this book, together with a complete account of the resonance theory and a consideration of the telephone and other subsidiary theories.

The book deserves the attention of all interested in the subject.

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*Technique chirurgicale oto-rhino-laryngologique.* Deuxième fascicule: Fosses nasales, naso-pharynx, cavités accessoires. By E. J. MOURE, Professor in the Faculty of Medicine of Bordeaux; G. LIÉBAULT, formerly Interne of the Hospitals of Paris; and G. CANUYT, Director of the Oto-Rhino-Laryngological Clinic of Strasbourg. Paris: Libraire Octave Doin. 1924. Pp. 527. Fr.55.

THE aim of this book is to describe in full detail the operative procedures required in the treatment of diseases of the nose, naso-pharynx, and nasal accessory sinuses, together with a more concise account of the indications, complications, and after-treatment of each operation. In this the authors have succeeded admirably, and the book is one which will be of interest and assistance to anyone about to undertake the operations described in it. Only one operative method is usually discussed at length in each case, although other procedures are often mentioned and arguments given for or against their adoption. Prof. Moure has such a great reputation that his opinions on such matters must command the respect and interest of laryngologists in this country. The lavish illustrations are a noteworthy feature of the book, especially the drawings by S. Dupret, which are mostly full-page and fully life-size, and which depict each stage of the major operations. The operation of lateral rhinotomy, especially associated here with the name of Prof. Moure, is very fully detailed and illustrated; indeed, it is described twice over in different chapters, and some 10 or 12 full-page illustrations are printed twice in almost identical form. Two variations of this method of obtaining access to the nasal passages are given, and Prof. Moure rightly insists that they are distinct operations; the first, called "ethmoidectomy," includes removal of the nasal process of the frontal bone and gives access to the roof of the nose and the sphenoidal region; while the trans-maxillo-nasal operation opens the antrum and also gives access to the nasopharynx.

Although the work deals largely with these and other major operations, minor procedures, such as cauterisation and the treatment of epistaxis, receive attention, and it is in such lesser matters especially that the methods recommended differ in some particulars from the practice in general vogue in England. Local anæsthesia is recommended for operations up to, and including, those of the magnitude of the Caldwell-Luc operation; and it is described, though not definitely preferred, for the frontal sinus operation and even for lateral rhinotomy. For the removal of adenoids no anæsthetic, local or general, is the rule; and the authors feel so strongly on this point that they say that "for some years a tendency has shown itself in favour of general anæsthesia with chloroform, and certain operators, following in this a bad foreign influence, have made a regular surgical intervention of the removal of adenoids." Other points of interest

may be mentioned. Cauterisation of the inferior turbinals, to reduce hypertrophic swelling, is condemned, as the effect only lasts for a few months, and vibro-massage of the mucous membrane is preferred. Prof. Moure still removes septal spurs with his spoke-shave; and he does not consider a traumatic or irregular septal deviation suitable for submucous resection, but prefers to cut away the convexity with its muco-perichondrium, leaving only the mucosa on the concave side. For chronic antral suppuration he employs the Caldwell-Luc operation, and considers the intranasal route insufficient; he curettes away all the antral mucosa, sews up the gingival incision, and packs antrum and nose with a long strip of gauze which is only completely removed by the end of six or eight days. For frontal sinusitis he condemns both the intranasal operation and removal of the anterior wall, and claims that he has proved that the frontal sinus, thoroughly curetted, is obliterated during healing; he performs the Ogston-Luc operation and sutures the external wound completely, leaving a long strip of gauze in the sinus to be gradually removed through the nose.

Although certain of these methods will not meet with general approval, the book is a most valuable and instructive one.

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*Die Funktionsprüfung des Akustischen und Statischen Labyrinths.* By Dr. MAXIMILIAN RAUCH, Assistant to the University Clinic for Diseases of the Ear, Nose, and Larynx. Vienna and Berlin: Julius Springer. 1924. Pp. 71. 80·60.

IN this little book Dr. Rauch has, at the request of his pupils, put together and expanded a series of articles on examination of the vestibular apparatus which he wrote in 1912. To this he has added a preliminary section on the functional testing of hearing, which provides an adequate description of all the usual tests. The examination of the static labyrinth is, however, a much more complicated matter, and it is extremely difficult for the student to memorise accurately the different directions of the nystagmus which results from stimulation of each semicircular canal by mechanical rotation and by caloric stimulation. The nystagmus is the direct result of movement of the endolymph in the canals, and consists in a slow component due to this movement and a rapid component due to cerebral correction; the fundamental rule, from which the direction of the nystagmus can be deduced, is that the slow movement of the eyes is in the same direction as the movement of the endolymph. Dr. Rauch has set out the methods of testing and the reactions in considerable detail, aided by photographs of a large-scale model of the membranous labyrinths, and with sufficient clarity to be of great help to those studying this intricate subject; it is unfortunate that, by a misprint, the right labyrinth is named the left, and vice versâ, in one of the illustrations.

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BOOKS FOR NURSES.

*Practical Nursing.* Sixth edition. By H. E. CUFF, M.D., F.R.C.S., and W. T. GORDON PUGH, M.D., B.S. London: William Blackwood and Sons. 1924. Pp. 635. 10*s.* 6*d.*

Dr. Gordon Pugh has brought up to date a book already popular with the nursing profession, which in its original edition formed the foundation of much theoretical instruction in a great many of the leading training schools. The subjects dealt with in the latest edition cover the curriculum of training in nursing, hygiene, and dietetics required by the General Nursing Council, and the book supplies a comprehensive text-book for all nurses wishing to qualify for the State Register. The chapter on hygiene gives evidence of the growing demand that the trained nurse shall comprehend the underlying principles of public health, and that these principles should form part of her hospital training. Excellent chapters on fevers and fever nursing, the nursing and feeding of sick children, and diseases of the nervous system should prove helpful to nurses working in special hospitals who may wish to qualify for one or more of the supplementary parts of the State Register.

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*A Manual of Nursing Procedures.* By E. PRISCILLA REID, R.N., MABEL HOFFMAN, R.N., HAZEL JENNINGS, R.N., and LILLIAN A. READ, R.N. London and Philadelphia: W. B. Saunders Company. 1924. Pp. 181. 8*s.* 6*d.*

THIS book sets out the nursing procedures in the American hospitals with which the authors are specially acquainted, and should prove of value to nurses trained at those schools and elsewhere. It should also prove useful to probationers preparing for examinations. The text is concise, and tabulated under headings which include the purposes, the required equipment, the method of procedure, and the necessary precautions of the carrying out of several nursing duties, the object of adopting this form being to save confusion, time, and energy. Excellent illustrations elucidate the text and emphasise correct nursing technique.

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*Belle Vue School of Nursing.* By DOROTHY DIX HILL. New York: The Macmillan Company. Pp. 187.

Miss Hill has arranged concisely a tabulated list of recipes based on the nursing procedures adopted at Belle Vue School of Nursing, New York. The chapter on bandaging is undoubtedly the best contribution in the book, although one would question the advisability of pupil nurses being taught to fasten a bandage with a "pin" as an alternative to fastening it with a safety-pin. The book may prove of value to the pupil nurses at Belle Vue, but as the underlying principles of nursing are only dealt with in a very limited sense it cannot be considered a substantial addition to nursing literature.

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*Maternity Nursing in a Nutshell.* By ELIZABETH H. WICKHAM, R.N., Former Supervisor of the Maternity Department, Lebanon Hospital, N.Y. Philadelphia: F. A. Davis and Co. 1924. Pp. 167. 81.50.

THIS little manual will probably be of service to graduate nurses in America who are not midwives and have only a limited knowledge of maternity nursing. The British nurse may be interested in it as illustrating American methods, but as most of them who do maternity nursing are midwives they will find the book too slight and sketchy to be of service. In dealing with the emergency treatment of post-partum hæmorrhage, Miss Wickham gives the usual measures—massage, ergot, posture, hot vaginal douche (124° Fahr.!), but adds that if these fail the nurse should "as speedily as possible proceed to pack the uterus." This is a difficult operation at any time, and certainly not one to be adopted by a nurse. No mention is made of bi-manual compression or intramuscular injections of pituitary extract. Miss Wickham gives her views on "twilight sleep," but omits to lay stress on points to be observed by the nurse in such cases. Shell-fish is advised when breast milk is deficient; the author believes that such food increases the supply of milk when all other foods fail. There are a glossary, appendix, index, and a good supply of illustrations to this little book.

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NOUVEAU TRAITÉ DE MÉDECINE.

Edited by G. H. ROGER, F. WIDAL, and P. G. TEISSIER. Vol. VIII.: Pathologie des glandes endocrines; troubles du développement. Paris: Masson et Cie. Pp. 455. Fr.40.

WE have previously had occasion to remark on the excellence of this system of medicine. The present volume maintains, in many respects, the high standard

of its predecessors. The articles on diseases of the pituitary and thyroid glands, especially those by G. A. Sézary and A. Souques, are models of precise reasoning, and the numerous illustrations with which the whole volume is embellished form a clinical collection of great interest. The section on the pathology of the suprarenal glands is marred by the over-emphasis laid on the supposed syndrome of hyperfunction of those organs. Without questioning the possible occurrence of this syndrome on the existing evidence, there are no grounds for dogmatic statement, and this article departs from that spirit of critical examination which should be present always in systematic medicine.

# Reports and Analytical Records.

## "TABLOID" PARATHYROID.

(BURROUGHS, WELLCOME AND CO., SNOW HILL BUILDINGS, LONDON, E.C. 1.)

TABLOIDS prepared from pure gland substance enable the clinician to make use of the action of parathyroid in regulating the calcium metabolism of the body. The use of parathyroid in many and diverse pathological conditions is now well supported by medical evidence, and this preparation has been made by trained workers and has undergone close inspection to ensure the genuineness of the product. Each "tabloid" product represents two-fifths of a grain of fresh gland, equivalent to one-tenth of a grain of desiccated gland substance. "Tabloid" Parathyroid Gland is issued in bottles of 25.

## "OSMO" KAOLIN (MORSON).

(ALLEN AND HANBURYS, LTD., PLOUGH-COURT, LOMBARD-STREET, LONDON, E.C. 3.)

Kaolin, or aluminium silicate, has proved useful in medicine mainly because of its important quality of adsorption, but it is, of course, necessary that its purity should be unquestioned. "Osmo" Kaolin (Morson) is a pure colloidal preparation presenting kaolin in an exceedingly fine state of subdivision secured by a special process of preparation. Its use is indicated in intestinal stasis and its sequelæ, and generally where alimentary toxæmia is present, while it has proved helpful, according to many observers, in dysentery and diarrhœa. Externally as a cataplasma to remove œdema and to relieve the pain and swelling of inflammation it has been successfully employed. The preparation is supplied in 8 oz. cartons.

## TETRAFORM.

(BRITISH DRUG HOUSES, LTD., 16–30, GRAHAM-STREET, CITY-ROAD, LONDON, N. 1.)

Carbonis tetrachloridum has been used as an inhalant in the relief of hay fever, as an anodyne for neuralgic pains, and as an anthelmintic, especially in the treatment of hook-worm disease in America. In any case the purity of the drug is essential, as impurities such as carbon bisulphide and phosgene are excessively toxic. The British Drug Houses, Ltd., have put upon the market a preparation, Tetraform, which is guaranteed to be free from these and other poisonous substances. The standard of purity which Tetraform is guaranteed to comply with is set out by the B.D.H. firm as follows:—

"It gives no reaction to the alkali plumbite test for sulphur compounds, including carbon bisulphide, thus indicating the absence of these toxic impurities; it contains no free acid, no chloride, and no free chlorine; it yields no appreciable residue on evaporation; and it gives no reaction to the potassium test for organic matter and aldehydes."

It is claimed to be a perfectly safe remedy in the treatment of ankylostomiasis and other intestinal diseases due to parasites, the doses and age modifications being carefully observed, but its exact action as an anthelmintic is not quite certain.

## GLAX-OVO.

(GLAXO HOUSE, 56, OSNABURGH-STREET, LONDON, N.W. 1.)

This new dietetic preparation consists of the solids of milk combined with malt flour, cocoa, sugar, and an antirachitic extract of cod-liver oil in a highly concentrated form. The percentage composition of essential foodstuffs is stated as:—

| | | | |
|---|---|---|---|
| Moisture .. | 2·5 | Carbohydrate .. | 62·2 |
| Fat .. .. | 13·3 | Ash .. .. | 3·7 |
| Protein .. .. | 18·3 | | |

Cane sugar is present to the extent of 18 per cent. and cocoa (containing 22 per cent. cocoa butter) to the extent of 6 per cent. In respect of that factor in which cod-liver oil is peculiarly rich—namely, the factor controlling calcium metabolism—a marked degree of success is claimed, for it appears to have been concentrated no less than 2000 times. Glax-ovo is supplied in the form of a powder contained in air-tight tins, and needs the addition of boiling water only to prepare a beverage with the distinct flavour of chocolate. It provides a means of obtaining the benefit of cod-liver oil without its unpleasant qualities of flavour and repetition.

## UBANA.

(UBANA SHOKAI, 83, EBURY-STREET, LONDON, S.W. 1.)

This is a crude native sulphur said to be a hot-spring concentrate imported from Japan. When analysed it was found to have the composition:—

| | Per cent. |
|---|---|
| Sulphur .. .. .. .. .. .. | 68·9 |
| Moisture.. .. .. .. .. .. | 1·5 |
| Acidity (as sulphuric acid) .. .. .. | 0·8 |
| Inert matter of a siliceous character .. .. | 28·8 |
| Iron .. .. .. .. .. .. | trace. |

The sulphur is intended for use in a hot bath, two handfuls of the preparation mixed in a bath being sufficient for all purposes, the body remaining immersed for 15–20 minutes. For local application the affected parts may be bathed with a solution of the same strength. Directions are given for the use of Ubana internally in digestive disorders. Apart from its application in diseases of the skin, sulphur has been recommended for neuritis, gout, and some forms of rheumatism.

## PRUNOL OR PRUNE JELLY.

(PRUNOL, LTD., 4, PICKERING-PLACE, No. 3, ST. JAMES'S-STREET, S.W. 1.)

Prunol is a preparation of prunes, Demerara sugar, senna, and ginger, things in this or a similar combination well known for their laxative properties. It is a safe remedy for children and has proved useful not only in constipation but as a mild purgative in inflammatory conditions. Where easy and regular motion is desired, the average dose for an adult is one full teaspoonful to be taken when retiring at night, while for children of from 4 to 6 years of age a smaller dose is sufficient.

## "KRAFT" CANADIAN PASTEURISED CHEESE.

We have received from Colonial Produce Publicity (47 and 48, Berners-street, London, W. 1) a sample of a cheese prepared by the "Kraft" process of pasteurisation which kills the gas-producing bacillus and enables a rindless cheese to be placed on the market. Cured cheese is blended to taste with fresh cheese, both in finely-divided form, and the blend is placed in a steam-jacketed kettle, containing an agitator, until the product is reduced to about the consistency of soft putty. It is then transferred hot to boxes, previously lined with tinfoil, the cover of which, when nailed on, acts as a press. The envelope obviates the cheese being exposed to dirt or harm, and is a protection against mould, evaporation, and shrinkage. We can testify to the product being both palatable and digestible. It is highly desirable for such a staple foodstuff as cheese to be delivered to the customer in a sealed packet, and the "Kraft" pasteurised cheese is everything that a cheese should be.

# THE LANCET.

*LONDON: SATURDAY, SEPTEMBER 27, 1924.*


## EDUCATION IN HEALTH.[1]

FROM his office window at the Ministry of Health the Chief Medical Officer looks down on the flow of humanity in the street outside and observes how far the available knowledge of hygiene has penetrated into the everyday life of the people. In some respects the change has been rapid. Where, a hundred years ago, intemperance was the Englishman's besetting fault, gross and widespread drunkenness has almost disappeared. Fifty years ago a commercial firm was able to announce itself as bug destroyer "for the upper classes only," without there being any obvious absurdity in the existence of enough bodily parasites in such circles to make good business. Twenty-five years ago the tight clothing and trailing skirts of women were part of a manner of life which produced a form of anæmia so common as to constitute a considerable part of out-patient material at our hospitals. The prevailing fashion in dress along with more active amusements and the open-air habit have made chlorosis as rare or perhaps rarer than pernicious anæmia. But still, as Sir GEORGE NEWMAN reminds us, people suffering from colds sneeze and cough into each other's faces; too many people live in overheated, ill-ventilated, and stuffy rooms, on leaving which for the less sheltered streets they fall victims to bronchitis and pneumonia; many valuable and cheap foods are almost entirely neglected. The public is unaware that milk, butter, vegetables, fruit, and other foods are preserved, coloured, or adorned with substances which may not be harmless. They have not learned to regard tuberculosis as the result of personal infection or of drinking tuberculous milk, or they would have put these beliefs into effective application. Sound practice lags behind the ascertaining of truth, and Sir GEORGE NEWMAN laments the fact that the enlightenment of the public has not kept pace with the progress of science. Mental hygiene, that most fruitful field for popular health education, is as yet almost untouched; life might be prolonged, its capacity and value enhanced out of measure by periodic medical examination, willingness to accept advice on health maintenance, and diligence to learn the laws of hygiene.

Everyone agrees that public education in health must begin early. What form, Sir GEORGE NEWMAN asks, should the teaching of hygiene take in the elementary schools? On the one hand, the child can be given information respecting the theory of hygiene, or on the other he may be taught by practice to form certain habits. By universal consent the child is just handed a toothbrush and told to clean his teeth. He learns these things because they are accepted as a daily routine. In America they are made a form of kindergarten play. If only Mr. NEVIL MASKELYNE, whose death we deplore, had incorporated some health tricks in his programme countless children would have learned them for life at one visit. Practice is vastly more cogent than precept. At a recent meeting of the Dumbartonshire Education Authority a suggestion that teachers should give special short health talks to pupils was met by the riposte that the Education Authority itself required health talks on the subject of issuing to the children in their schools filthy and dilapidated books. The gloom and grime of many elementary schools further south than Dumbarton, and the condition of their lavatory accommodation, are such as to set a low standard of cleanliness in the minds of many school-children which no amount of precept can subsequently alter. It is for this reason that the school medical service has within it the germ of vastly potent hygienic education. It was only in 1907 that the system of medical inspection and treatment of school-children was established by Act of Parliament, and we can still recall the consternation aroused in 1908 when Dr. JAMES KERR, who has just retired from his great office under the London County Council, gave out that at least 90,000 children in the London schools were urgently requiring medical treatment. Things are changed to-day, when not only do children obtain medical treatment in London as a matter of course, but the school is the acknowledged centre for the control and prevention of disease, and the school medical service the proven means of increasing the health and strength of the population and of diminishing the mortality-rate. The influence of this service has percolated into the life of the whole country, and its principles have even penetrated the public schools.

Health methods will not be accepted by the people of this country if they are foisted upon them against their will. Nevertheless, as we learn[2] from Mr. T. B. PARTINGTON, two years' experience has shown the cinema to be a new force in fighting venereal disease; night after night he has demonstrated in packed halls seating 2000–3000 Lancashire men and women. They were there out of curiosity, you might say. Mr. PARTINGTON meets this objection by recalling the loud applause, given as only northerners can give it, as he pleaded for a higher moral standard for the stamping out of venereal disease in the large manufacturing towns of Lancashire, where a week's campaign resulted in a remarkable increase in the attendance at the venereal disease clinic. The holding of propaganda weeks of various sorts has in many parts of the country taken effective hold of public opinion, whether under the name of Baby Week, Health Week, or Rat Week. Of the written word, the annual report of the medical officer of health is a form of propaganda work of which insufficient use is made; such reports afford opportunity and scope to guide the public in the directions of advance appropriate for the locality. The first and best form of hygienic education is the effective administration of the public health, including medical services. With the possible exception of Leicestershire, the insurance committees, which were entrusted by the Act of 1911 with the duty of giving lectures and publishing information on questions relating to health, have failed to make this provision. They may have realised from the first that the bulk of their educational work could only be performed effectively by the insurance practitioner himself in the ordinary discharge of his duty. On the direct methods for providing supplementary teaching over and above these well-authorised channels, Sir GEORGE NEWMAN makes hints and suggestions which are set down at length on another page. The potentialities for public health teaching of the cinema and of the wireless can hardly yet be properly assessed, but they are evidently boundless.

[1] Public Education in Health. A Memorandum addressed to the Minister of Health by Sir George Newman, K.C.B., M.D., F.R.C.P., Chief Medical Officer of the Ministry of Health and of the Board of Education. H.M. Stationery Office. 6*d*.

[2] The New Force in Public Health Propaganda. Fighting Venereal Disease with the Film. By Thomas Bowen Partington, F.I.L., Lecturer to the National Council for Combating Venereal Diseases, 102, Dean-street, London, W. 1.

## TUBERCULOSIS IN THE SERVICES.

THE report on the health of the army for the year 1921, just issued as a Blue-book (H.M. Stationery Office. Price 3*s*.), is the first to be presented by Sir WILLIAM LEISHMAN, who explains its delayed appearance by the many changes involved in the gradual reversion to a peace footing. It contains much of interest to which we shall return. We have now seen the reports for this year from all three of the fighting services, and have extracted from them the figures given for tuberculosis. It is a little surprising

*Tubercle (Pulmonary and Other) in the Fighting Services during 1921.*

| — | Rates per 1000. | | | Actual numbers. | | |
|---|---|---|---|---|---|---|
| | Cases. | Deaths. | Invalids. | Died. | Invalided. | Total wastage. |
| Army .. .. | 2·0 | 0·23 | 1·43 | 57 | 342 | 399 |
| Navy .. .. | 2·38 | 0·28 | 2·33 | 31 | 247 | 278 |
| Air Force .. | 1·7 | 0·14 | 1·41 | 4 | 40 | 44 |
| | | | Total .. | 92 | 629 | 721 |

to note that in none of the reports is any special consideration given to these figures. Eighty years ago 89 men died of tuberculosis among the 5000 Foot Guards, a rate of 17·6 per 1000; of hospital admissions from another unit, 236 out of 286 died; and the terrible prevalence of tuberculosis in the army seems to have been the agent which first compelled thought for hygiene in that service. Now, although relatively few deaths are ascribed to tuberculosis as compared with some diseases such as malaria and pneumonia, the total loss to the services is still great. In 1921 it amounted to 721 fighting men. Some instruction may be gained by comparing the prevalence of pulmonary tubercle with that of pneumonia, tonsillitis, and bronchitis in the various military areas. Arranging these in order, beginning with London and the Northern Command, where tubercle is heaviest, downwards to Ireland, where it is least, it will be apparent that pneumonia stands in no relation to tubercle, although in the United Kingdom bronchitis and tonsillitis vary to some extent with it. For stations abroad there appears to be no similarity whatever between the curves. The question arises: Why has Ireland in 1921, with 50,531 men employed there, in circumstances, the report says, of hardship, lower rates than any other Command in the United Kingdom for pulmonary tubercle, tonsillitis, pneumonia, and the second lowest rate for bronchitis? A possible explanation is the want of association, at that time very definite, between troops and civil population. More recent figures may give the clue. In 1921, in the United Kingdom, the highest pulmonary tubercle-rate was 3·1, in London and the Northern Command; the maximum for pneumonia was 6·3, in the Western Command; for bronchitis 48·0, in the Northern Command, already mentioned with the maximum for pulmonary tubercle. London has the highest rate, 62·8, for tonsillitis. These relations deserve further study.

## SPONTANEOUS AND EXPERIMENTAL ENCEPHALITIS IN RABBITS.

THE experimental transmission to animals of epidemic encephalitis and other affections of the central nervous system forms the subject of a critical review by Dr. C. DA FANO in the August number of *Medical Science*. Our knowledge of the so-called spontaneous encephalitis of rabbits dates only from 1922, though its occurrence had been suspected by C. B. BULL since 1917. It has now been ascertained that it affects not only rabbits but also mice, and that it occasionally manifests itself in the shape of circumscribed epizootics. It is more diffuse in certain countries, notably America, than in others, and does not, as a rule, give rise to symptoms. These may, however, be present, particularly when the disease occurs epidemically or if the rabbits are used for experimental procedures on their central nervous system. The onset is usually insidious and the first indication of any trouble is the wasting of the animals. The temperature is at times subnormal, though fever has occasionally been observed. The hair falls out in patches and there is some discharge from the eyes. As the disease progresses emaciation becomes profound and muscular weakness and convulsions occur. Some authors noted persistent drowsiness, followed in most cases by tremor shortly before the development of paralysis which may be slight or marked, general or localised. In such cases the mortality is high, though the animals can survive several days and even recover. Death may supervene during a convulsion, which is sometimes preceded by coma, or takes place in coma.

Histologically, the disease is characterised by small-celled infiltrations, nodular cell aggregations, and focal necrotic areas associated with a variable degree of nerve-cell degeneration. The infiltrations can be meningeal, peri-vascular, subependymal, and parenchymatous and differ greatly in intensity in different animals; they consist of lymphocytes and some plasma cells, while polymorphocytes are, as a rule, absent. The nodular cell aggregations also consist of mononuclear elements of the lymphocytic type, and may be so large as to be visible to the naked eye in stained specimens. The necrotic foci are generally formed of a definitely necrotic centre surrounded by an inner ring of epithelioid cells and an outer layer of mononuclear elements. The malady is probably related to a form of spontaneous nephritis, investigated in 1919 by E. T. BELL and T. B. HARTZELL; it is transmissible from animal to animal by cage infection and by intracerebral inoculation of sedimented urine and brain or cord emulsions from sick rabbits, and has been shown to be due to a protozoon-like parasite which according to some authors is a microsporidium belonging to the sporozoa. The parasite has been detected in the brain and kidney lesion of affected rabbits and mice, but its life-cycle is, so far, unknown. Dr. DA FANO suggests that the unsuspected occurrence of this affection has misled various authors in their attempts at transmitting to rabbits syphilis, general paralysis of the insane, and epidemic encephalitis, in so far as they describe symptoms and histo-pathological lesions which he considers characteristic of the spontaneous parasitic disease. Similarly LUCKE's observation of spontaneous encephalitic lesions in monkeys is held by the reviewer to invalidate the few recorded instances of presumed transmission of the epidemic disease to those animals.

The last ten pages of the review are devoted to a discussion of the interlaced questions of the herpetic and encephalitic viruses. It is now established that the vesicular fluid of all forms of herpes, other than idiopathic herpes zoster, contains a virus which, when inoculated into rabbits and other domestic animals, gives rise to a meningo-encephalitis or a meningo-encephalomyelitis with involvement of certain cranial, spinal, or even sympathetic ganglia. This experimental disease is generally characterised by a certain incubation period, a peculiar symptomatology, transmissibility in series, and sufficiently characteristic inflammatory and degenerative lesions. It is, in the main, easily distinguished from the parasitic form. The herpes virus is endowed with biological properties which may now and then undergo certain variations and is probably more diffuse than has hitherto been suspected; it has been occasionally found in the saliva, nasopharynx, cerebro-spinal fluid, blood, and even fæces not only of subjects exhibiting skin lesions, but also of apparently healthy carriers.

LEVADITI and other workers have succeeded in isolating from the brain substance, nasopharynx, and cerebro-spinal fluid of cases of epidemic encephalitis a limited number of so-called encephalitic viruses. However, when inoculated into rabbits and other laboratory animals, these viruses give rise to a transmissible disease which is clinically and histo-pathologically identical with that due to the herpes virus, and the so-called encephalitic viruses are indistinguishable from herpetic strains by available biological tests. It is, therefore, possible that the so-called encephalitic viruses are in fact only herpetic strains found by chance in the material employed for experimental transmission, and that they may have nothing in common with the ætiological agent of epidemic encephalitis. It would thus appear to be still uncertain whether the unequivocal transmission of epidemic encephalitis to animals has as yet, after all, been achieved; if this should prove to be so its ætiology would have to be investigated anew.

# Annotations.

"Ne quid nimis."

## THE INDEX GENERALIS.

THE ideal personal reference book for the medical seeker is yet to find. Even the "Medical Register," whose alphabetical arrangement and official accuracy make it so satisfying, suffers from the disability, which we understand can only be removed by Act of Parliament, of containing two smaller alphabetical lists at the end where they may readily be overlooked; and the value of the "Medical Directory," as a more detailed fount of accurate information, is seriously depreciated by the disappearance of the asterisk which implied that entries had been revised to date. All other lists of reference suffer more or less from the varying estimate of who's who and what's what. On a more universal scale, the year-book familiarly known as "Minerva," when first issued in 1891 from the publishing house of K. J. Trübner, in Strasbourg, possessed practically a monopoly as a guide to the learned world. The twenty-third edition appeared at Strasbourg in 1914, the twenty-fifth edition in much diminished form in 1921 as a publication of the Union of Scientific Publishers of Berlin and Leipzig. The basis of "Minerva" is, of course, the German tongue, although the names of institutions are generally given in the language of the particular country. A serious competitor to "Minerva" has now appeared in a handsome English edition of the "Index Generalis," described as the year-book of the universities, libraries, astronomical observatories, museums, scientific institutes, academies, learned societies,[1] of which the French edition came out in 1919 as a thin paper-covered volume. Mr. H. J. Waring who, as Vice-Chancellor of the University of London, commends it to the attention of the scholar, the administrator and all concerned in the development of higher education, indicates in a preface what such an enterprise entails upon editor and publisher. The Index contains more than 6400 separate entries, for the most part in the language of the source from which it arose, except for a few countries of minor importance which are given in French. Technical terms have been avoided as far as possible, but, for such as are used, a short vocabulary is given at the end of the book. An alphabetical list of more than 70,000 names enables the reader to locate anyone who comes within the scope of the book, and the indexer has been kind in indicating whereabouts on the page the name appears. It would be easy to carp at a host of minor inaccuracies or at the coarse yellow paper and rather unattractive type used by the Bordeaux printer. It is also annoying to find the first few sections of the book separately numbered under topographical headings; thus, the British Empire has 165 pages, followed by the United States with 160 pages and by France with 169 pages, a number of advertisements being insinuated as "buffer states." But no one who has frequently felt the want of such a book can fail to be grateful to the editor and the publisher for a work of eminent value and one that will spare the honest seeker hours of fruitless search. We commend the book most cordially wherever it is necessary to identify the learned people of all nations and countries, and desire for it the wide circulation which will enable the publishers cheerfully to bring it up to date year by year and to ensure its substantial accuracy.

[1] London: J. M. Dent and Sons, Ltd.; Paris: Editions Spes. 22*s.* 6*d.* Issued under the direction of Dr. R. de Montessus de Ballore, D.Sc., Laureate of the Institute of France.

## PROFESSIONAL PITFALLS.

A STUDY of the annual report of one or other of the great medical protection associations is always a matter of interest to the practitioner in that it brings a realisation, perhaps for the first time, of some of the pitfalls in the rough road of professional life which he may have been so far lucky enough to escape. We have on previous occasions in these columns urged the importance to all medical men of ensuring adequate professional protection for themselves, and the report of the Medical Defence Union for the year 1923–24 shows a steady and healthy increase in the number of members, which in July, 1924, amounted to 11,550. The Council of the Union states that the number of cases with which it dealt has increased and that there is reason to believe that charges against medical practitioners are becoming more frequent, possibly because certain actions lately heard in the High Court have encouraged patients to seek to obtain damages from their medical attendants when recovery has been more prolonged or less complete than they imagine it should have been. Members of the Union have been advised by the Council on a variety of subjects which extend alphabetically from Acts of Parliament to X ray burns, including such matters as debt collecting, door plates, herbalists, and housing difficulties. Up to the end of 1923, 76 cases were placed in the hands of the Union's solicitors. Of these cases, 9 were concerned with libel or slander, 25 with malpraxis, 8 with prosecution of unqualified persons, and 34 with arbitration and personal matters. It is noteworthy that actions in which a charge of malpraxis or negligence is raised are greatly in the majority, while there is a marked falling off in actions for libel and slander; and it is also of interest to note that the number of unqualified practitioners for the supervision of whom action has been taken has remained fairly constant since 1909. This branch of the Union's work is one that is generally recognised as being of extreme importance not only to the medical profession but to the public at large. But this figure does not represent the total number of cases that were investigated by the Council in which no legal action could be taken, as bogus medical practitioners for the most part are fully alive to the significance of the penal clause of the Medical Acts, which prohibits the wilful and false assumption of title only and not unqualified practice, and thus manage to remain just within the law while imposing on the public. Unfortunately, there is no immediate prospect that any alteration of the law in this respect will be obtained. A marked decrease in the number of prosecutions for libel against medical men, which has fallen from 31 in 1919 to 9 in 1923, may be interpreted as an indication of the widespread recognition of the power of the Union.

The solicitors give details of a few cases which cannot fail to be instructive and illuminating. The first quoted deals with the action which was conducted on behalf of a member of the Union against several officials of a miners' lodge who had circulated a pamphlet amongst the other members of the lodge to the effect that the medical man was incompetent and biased against the workmen in his capacity as a medical referee under the Workmen's

Insurance Act. After a protracted hearing the case resulted in a verdict for the medical man, with £100 damages. Such a case as this will help to improve the position of medical men practising among miners. Reference is again made to the extreme importance of securing an X ray photograph in a case of suspected fracture or dislocation. This we referred to in a similar connexion some months ago,[1] and is emphasised in a clinical note which appears on p. 649. During the year the solicitors were consulted on several occasions by medical men holding public offices where the attempt was made by the public authorities under whom they were employed to reduce their salary, and it was pointed out that where a contract provides for the employment of an official at a fixed salary, that salary cannot be reduced save by mutual consent, and the only way of enforcing reduction is by termination of the existing contract and the creation of a fresh contract at a reduced salary. This view, the solicitors state, has now been adopted by the Ministry of Health. A word of advice on the conduct of any case is always valuable, and the solicitors make a special appeal to medical men consulting them that a full statement of the facts bearing on the case directly or indirectly should be made, and they add: "Members of the medical profession will appreciate that the correct diagnosis and treatment of a case may depend on details or symptoms which appear to the layman to be insignificant and to have no bearing. This is equally true of legal matters." An interesting case is reported where a complaint was made against a medical man of employing a woman to attend childbirth who was not certified under the Midwives Act of 1892. The solicitors warn medical men to be on their guard against the presence of unqualified midwives at any obstetrical case. Such women are liable to make use of doctors to cover them in their practices. Medical men by virtue of their calling are practically under obligation to attend any case of emergency, but when they are called in by an uncertified midwife they run a considerable risk if they sign a certificate to enable the mother to obtain maternity benefits under the National Health Insurance Acts. It is wise for physicians, if they receive a series of these emergency calls from uncertified women, to make it strictly clear either that they will not respond to any future calls or if they do respond that the woman in question must at once leave the case.

As an instance of a liability which may be unwittingly incurred in connexion with the sale of a practice by a medical man, the following case is worthy of quotation in some detail. The solicitors state:

> A member of the Union inserted an advertisement in the medical press notifying his intention to dispose of his practice and inviting purchasers to communicate direct with him. He advisedly did not consult agents, as he preferred to effect a sale without their intervention. That this practice was for sale came to the knowledge of a certain firm of medical transfer agents, who wrote the member informing him that they were sending down certain possible purchasers. The member did not acknowledge this letter in any way, though he saw the gentlemen who were sent by this firm, but he did not come to terms with them. Subsequently, another would-be purchaser came down, who was sent by these agents, which fact was never communicated to the member. Eventually, this gentleman purchased and the agents put forward a claim that the sale had been effected through their instrumentality. We were thereupon consulted by the member. The fact that the member had seen the original would-be purchasers sent down by these agents without informing them that he refused to deal with them in any way, in our opinion, was tantamount to accepting their services, and we thought that in the circumstances the Court would recognise their claim. We are glad to say, however, that we were able to induce the agents to accept a reduced fee.

If medical men avail themselves of the assistance of medical transfer agents, even though such assistance is volunteered and not invited, they may make themselves liable for the services thus rendered, and it is therefore advisable to refuse this assistance at once if it is not desired.

[1] THE LANCET, 1924, i., 1115

The benefits of the Union have been increased in two important directions. The first is geographical, in that membership is now extended to medical practitioners practising in the Irish Free State, Northern Ireland, the Channel Islands, and the Isle of Man; the second is financial, as from May 1st, 1924, the indemnity against damages and costs of the other side is unlimited. This latter extension is the outcome of the alarm caused in the profession by the damages originally imposed by the High Court in the Harnett case, and the policy of unlimited indemnity has been adopted both by the Medical Defence Union and the London and Counties Medical Protection Society. The solicitors' report ends with a tribute to the esprit de corps among members of the sister profession of medicine, which it would, perhaps, hardly be seemly to quote in these columns.

## EDUCATIONAL FACILITIES FOR MENTALLY DEFECTIVE CHILDREN.

THE problem of the mentally defective child is one with which sociologists have of late been much concerned, as the discovery that such children may be the pupal stage of certain social parasites—the unemployables—is of recent date. Yet there is evidence to show that thoughtful and adequate educative measures adopted towards these unfortunate children can make them in many cases worthy members, however humble, of the community. The Board of Education have for some time had under consideration the position of mentally defective children in the country generally, and they have recently issued a Circular (No. 1341) to the local education authorities, inviting coöperation in doing all that is possible under existing circumstances to ameliorate the lot of such children. At the moment it is impossible to make fully adequate provision for this work, owing to defects in obtaining suitable accommodation and funds, but, the Board points out, much can be done, even under present conditions, towards realising the aims of the Mental Deficiency Act of 1913 and the Elementary Education (Defective and Epileptic Children) Act of 1914. The first duty devolving on the local education authority is to make a thorough ascertainment of all mentally deficient children in their area who will thereby fall into two classes: first, those who ought to be notified forthwith to the Mental Deficiency Committee, and second, those who ought to be sent to special schools. Legal responsibility for the first class ceases as far as the local authority is concerned on notification. The second class, the important one, is further subdivided at present of necessity into two groups—namely, those for whom special school accommodation is available, and those who, in the absence of such provision, must either attend the public elementary schools or stay at home. Children in the special schools are supervised, under the Act, up to the age of 16, when they are either discharged as fit members of society, or, if need be, notified to the Mental Deficiency Committee and placed in institutions or under guardianship. Where no special school exists supervisory arrangements can be exercised through school nurses, care committees, paid welfare workers, or voluntary organisations, towards the cost of which the Board are prepared to furnish reasonable grants. At the age of 16 the mentally deficient child passes out of the sphere of the local authority, and it is at this point that a most serious gap exists in the educative machinery, as notification of appropriate cases to the Mental Deficiency Committee is often overlooked. The Board emphasises most earnestly the duty of the local authority in passing under review periodically all mentally defective children under the age of 16 in order that this gap may be bridged, and that the children may not be lost in the general population only to be rediscovered by the Mental Deficiency Committee or the police when from lack of supervision and help they have got into trouble and may have done serious damage both to

themselves and to the community. The problem of the child who does not require to be notified is not ended when he or she is passed out from the special school or its equivalent at the age of 16; employment must be secured and useful citizenship assured. Further supervision by an "after-care" association is of the utmost value. In Birmingham, the Special Schools After-care Subcommittee has been in existence since 1910. Its duties include keeping a record of the subsequent histories of former pupils of the special schools in the city and assisting them to find employment. The total number of former pupils in work has risen owing to the enhanced demand for labour in Birmingham in the past year, and 37 per cent. are shown to be earning wages as compared with 35 per cent. in 1922. In view of the allegations so often made that all criminals are mentally defective, it is interesting to note that an examination of the records of the Committee extending over a period of 21 years and relating to more than 3000 defectives shows that, except for certain cases of immoral conduct and others of petty thieving, criminal offences have been few. The work done by this Committee is of inestimable value not only to the individual concerned but to the community.

## ENERVATION OF THE KIDNEY.

PERIARTERIAL sympathectomy of the large vessels of the extremities is, owing to the strenuous advocacy of Leriche, undergoing a somewhat extensive trial, though as yet it is too soon to speak with any confidence of the ultimate place which the operation will assume amongst surgical procedures. E. Papin[1] was the first to suggest and carry out a similar operation for certain affections of the kidney. A study of the subject has been made by P. Flandrin[2] in Prof. Legueu's clinic. The sympathetic nerves for the kidney come off the semilunar ganglia and run a more or less regular course along the upper and posterior aspects of the renal artery, so that a decortication of that vessel will cut off all nerves running to the kidney. The operation upon the renal hilum may be comparatively simple if there is a single renal artery and if the pedicle can be approached at some distance from the kidney itself. But should the kidney not admit of delivery to the surface, or should there be an accessory renal artery, the procedure may become technically very difficult of accomplishment, and, apparently, there is a danger in the attempt of doing such damage to the renal veins that nephrectomy becomes the only outlet from a surgically embarrassing situation. The operation has been performed mainly for two conditions, nephralgia without discoverable lesion, and those cases of early hydronephrosis dependent upon a narrowing at the uretero-pelvic junction in which a plastic procedure or nephrectomy seems scarcely justifiable. As applied to the latter condition it will be most interesting to watch results which already bid fair to prove satisfactory. C. A. Pannett[3] considers that one group of these cases of hydronephrosis depends upon a reflex spasm set up at the uretero-pelvic junction, perhaps associated with a polyuria, and that in another group polyuria alone may cause a distension of the renal pelvis if it be associated with a congenital narrowing of the renal excretory duct at this particular point. It is possible that both the reflex spasm and the rate of renal secretion might be altered as the result of cutting off the kidney from its connexion with the central nervous system. Flandrin has studied the changes in urinary secretion as a result of enervation of the kidney. On the whole, he reports no changes in the urine after the immediate effect of the operation has worn off, but in two cases the secretion of urine was much interfered with. In these two patients the section of the renal nerves was particularly easy and certainly complete. He suggests that, perhaps, in the earlier operations, before facility in technique had been gained, a total enervation was not achieved and the good results depended upon the incompleteness of the operation. As to the subjective results to the patients, there has been uniformly an improvement. The lumbar pain has disappeared and the renal crises have been absent in all the small series of cases reported upon. These observations are exceedingly interesting and worthy of further study.

[1] Papin and L. Ambard: Arch. des maladies des reins et des org. genito-urin., 1922, 1.
[2] Arch. urolog. d. l. clin. d. Necker, 1924, iv., 101.
[3] Brit. Jour. Surg., 1922, ix., 509.

## VETERINARY OBSERVATION.

AT the opening of the Conference of the National Veterinary Association, which met recently in Aberdeen, the chairman appositely referred to the veterinary profession as the one, par excellence, in which observation was required. It was Prof. F. M. Caird, of Edinburgh, who was in the habit of initiating his students by making them practise "veterinary surgery"—the forming of a diagnosis independent of the questionable advantage of the patient's own account of his condition. It is unfortunate that the great mass of veterinary observation lies beyond the reach of even the medical man who takes the broad view of his subject. Many of the papers read at the above Conference had a direct medical interest—for example, Prof. S. H. Gaiger's discussion of the anaerobic infections in domestic animals. One can scarcely doubt but that an investigation of these conditions, as they occur among animals, will throw light on the anaerobic infections to which man is subject. A paper by Dr. J. B. ORR on the effect of nutrition on the incidence of disease was characteristic of the present trend of medical thought which was so long under the influence of purely bacteriological conceptions. In this connexion the veterinary practitioner has much to contribute. It is doubtful whether in the past more attention has not been paid to the feeding of stock than to the nutrition of the human race. Animals kept under what are at best artificial conditions demand in no small degree the applications of principles of feeding and hygiene which are based on sound scientific investigations or are the outcome of an interested empiricism. But between this accumulation of clinical knowledge, whether traditional or the result of research, and its application to human nutrition and the prevention of disease there has been in the past a great gulf fixed. That this gulf is now being bridged is largely due to the realisation—in America rather than in this country—that in the investigation of the physiology and pathology of domestic animals a double end is being served, the first an economic one, the second an illuminating of many dark places in the science of human medicine.

## RECOVERY FROM SPINAL FRACTURE.

IT is a curious fact that hitherto little information has been available as to the ultimate fate, as a class, of persons whose spines have been fractured. Dr. Augustus Thorndike, of the Surgical Division of the Maria Hospital in Stockholm, has recently[1] attempted to fill this gap in our knowledge by seeking an answer to the question: What is the fate of these patients in terms of ability to work? At his hospital between the years 1914 and 1924 there were 47 cases of fracture of the spine; they were consecutive, unselected cases, in all of which the diagnosis was confirmed by X ray examination, an operation, or a necropsy. Only in six cases were the fractures confined to the spinous processes. The bodies of the vertebræ were involved in the remaining 41 cases, 34 of which were unassociated with signs referable to the spinal cord. The fractures were cervical in 8 cases, dorsal in 18, lumbar in 18, and sacral and coccygeal in 3. The most frequent site of fracture was from the ninth dorsal to the fourth lumbar vertebra, and in as many as 16 cases two or more vertebræ were injured. The accidents were industrial in 57·7 per cent., and as great a proportion as 81 per cent. of these industrial

[1] Acta chir. Scand., 1924, lvii., 339.

accidents concerned the building trade, dock and common labour. After discussing briefly the modern treatment of fractures of the spine, Dr. Thorndike gives an account of the issue in his series. Of the seven patients whose spinal cords were injured, five died, one remained in hospital, and one could not be traced. Of the 40 patients without spinal cord symptoms, three were still in hospital, three had died of causes other than the accident, and ten could not be traced. Of the 23 patients who were re-examined by the X rays, all were found to have recovered sufficiently to return to work—in most cases to full-time work at their former occupation. The most important feature of this paper is its lesson that, given time and proper treatment, most fractures of the spine, provided the cord is not compressed, do not permanently incapacitate the patient who, if his occupation is clerical and not manual, may expect to return to his former work without loss of efficiency. The manual worker may also hope to do so, but after a longer interval than the clerical worker requires. The average time lost by those of Dr. Thorndike's patients who recovered was 330 days—a period long enough to disable financially most workers for whom there is no accident insurance. Dr. Thorndike concludes with the hope that more statistics may be published on this subject so that comparisons can be made between his material and larger series of cases.

## THE SKIN CIRCULATION.

THE demonstration, within recent years, of the independent contractility of the capillaries, together with improvements in technique for the examination of the skin capillaries, has caused a good deal of attention to be focused on the circulation in the skin. We know, for instance, that the colour of the skin gives an indication, and a very valuable one, of the condition of the capillary vessels within it, while the temperature of the skin surface enables us to judge of the state of the skin arterioles. Thus the skin can be cold and blue, indicating dilated capillaries and constricted arterioles, or cold and white, showing general vascular constriction, or warm and red when all the vessels are dilated. The study of cyanosis thus takes on a local as well as a general aspect. An account of this interesting subject may be studied in Prof. August Krogh's work on "The Anatomy and Physiology of Capillaries" (1922, Yale University Press). Some of the reactions of the skin to stimuli are also of considerable interest. After the application of mechanical stimuli to the skin there is often a transient red flush followed by the appearance of a localised constriction indicated by intense pallor. Sir Thomas Lewis has shown that this is a constriction of considerable intensity requiring a good deal of internal pressure to open up the capillaries again. The contractility of the skin vessels is to a considerable extent independent of the central nervous system, and, according to Prof. J. van Breemen,[1] thermal excitation provokes vascular reaction even after section of the cutaneous nerves. In an important article he shows how there is a definite relation between the amount of blood in the skin and that in the deeper structures of the body—the so-called law of Dastre and Morat—expressing this by saying that these amounts vary in inverse ratio. There is also believed to be a relation between the blood in certain parts of the skin and that in certain definite internal parts. Thus stimulus applied to the foot causes a contraction of the blood-vessels of the kidneys, while the stimulus of cold applied to the inner side of the thigh causes contraction of the uterine vessels. Further, there is a relation, expressed by the term "consensual reflex," between the skin of the two sides of the body. In accordance with this law, the application of cold to the skin of one arm will cause constriction of the skin vessels of both arms, as may be proved by plethysmographic tracings. Another characteristic of the skin circulation, to which Prof. van Breemen draws attention, is the extent to which it is affected by the contraction of the skin muscles. When the arrectores contract, not only does an erection of the hairs follow but the skin is emptied of blood as a result of the pressure put upon it. These facts are of practical interest in connexion with the mechanism of "taking cold," about which Dr. S. E. Kark writes on p. 683, and it would be interesting to know more about them.

[1] Archives of Medical Hydrology, 1924, No. 6, p. 179.

## THE NEW MEDICAL BUILDINGS AT CLEVELAND.

A MEMBER of our staff who has returned from a visit to the newly completed block of medical buildings at the Western Reserve University, Cleveland, Ohio, found that they left nothing to be desired as regards structure and equipment. The ground-plan of the block, situated in the suburbs of this beautiful forest city, is in the form of the letter E; the middle wing is occupied by staircase, and the L-shaped portions on either side of this contain the various departments. There is a large separate power-house and a central plant, from which refrigeration is "piped on" to each floor to supply rooms at suitable temperatures. Each department has its own well-equipped library and lecture room, and there are abundant research rooms, in which work has already commenced. The laboratories are equipped with every modern need in the way of benches, fume cupboards, compressed air, vacuum, distilled water supply, and so on, but there has been no money wasted on extravagant halls and staircases. Features of especial interest are the departments of pharmacology, experimental medicine, physiology, and anatomy. The teaching part of the pharmacology department, under Prof. T. H. Sollmann, comprises an excellent laboratory for chemical pharmacology, as well as the usual experimental pharmacology department; the department of experimental medicine, under Prof. Neil Stewart, is actively occupied with research work, especially on the suprarenals; the physiological department, directed by Prof. C. J. Wiggers, has admirable student arrangements for the study of human and mammalian physiology, as well as fully-equipped laboratories for the special investigation of the circulation. The most striking department, to an English visitor, is the anatomical, under the direction of a Manchester graduate, Prof. T. Wingate Todd. This is fully equipped for teaching and research, has a remarkable museum, and a surprising collection of human and animal skeletons, all fully described. The system of collecting data relating to the cadavers is noteworthy, as are also the arrangements for making skeletons, of which some 1200 have so far been collected in the course of a series of investigations on quantitative human osteology. We offer our sincere congratulation to the Western Reserve University and to Prof. Sollmann, who, as chairman of the Constructions Committee, has had much of the arrangements in hand, on a remarkable achievement for the advancement of medical knowledge.

## MIXED DRINKS.

THERE is a tendency, Dr. R. Fortescue Fox remarks,[1] for water-supplies to become more and more a compound of many sources, so that the great majority of people are compelled to drink mixed waters and never drink from a single source. This is true of the natural waters of lakes and rivers as well as of the water laid on in London and other large centres. Only the spring is an unmixed product, and from this basis Dr. Fox goes on to develop the theme, started in a series of lectures given at the University of London, that there may be some distinctive quality of value in water from a single spring. In many parts of the world, he mentions especially India and the West of England, there is a strongly-rooted popular belief in the efficacy of a change of water

[1] Medical Hydrology: Outlines for Practitioners and Students. Based upon Lectures given at the University of London by R. Fortescue Fox, M.D. London: J. and A. Churchill. 1924. Pp. 136.

when out of health. The benefit popularly derived from a change of air may, indeed, possibly be due rather to a change of water. The human body is sensitive to the influence of physical agencies, the effects of which are apt to be overlooked by reason of their very simplicity and familiarity. There is the added difficulty of clearing the stage for a single remedy of any kind, and it is especially difficult to separate what is essential in climatic treatment from what is accidental and adventitious. So much, however, has been learnt of the intimate physical characters of water and waters in the last 20 years that the claims of hydrotherapy may well have to be considered in the light of them. Dr. Fox's book is of value in providing theorems which can be put to an exact test. He crystallises his conclusions into 50 aphorisms, such as the following :—

(9) As there is an optimum temperature for life, so disease may be regarded as a question of heat.
(17) Deep-seated organs are affected by operating on related areas of the skin.
(22) The vapour bath counteracts the ill-effects of the British climate.
(36) Many remedies cure by intensifying a chronic process.
(44) Cardio-vascular invalids are best treated in their own country.

These challenges to medical thought may be taken up with some gusto by those who think otherwise and lead to a rediscussion of some too readily accepted views. The brief section in Dr. Fox's book on the choice of a spa hardly does more than touch the fringe of large and debatable questions.

## THE PRINCIPLES OF TONSILLECTOMY.

THE tonsil shares with the appendix the unenviable reputation of causing more trouble than it is worth in the economy of the body, for there is no evidence to show that tonsillectomy even in infancy destroys an important function from the lack of which a patient would suffer, while it is generally believed that enucleation lessens the liability to infectious diseases. Dr. A. Brown Kelly, in a discussion of the subject at the recent annual meeting of the British Medical Association, at Bradford (Section of Laryngology and Otology), said that the two most common pathological conditions of the tonsils were sepsis and hypertrophy. The latter condition, he held, was most common in children, and there need be no hesitation in removing the tonsils and adenoids from a healthy child of 2 years or even 18 months. Tonsillar sepsis rather than hypertrophy was associated with adults, and, indeed, many tonsils which on inspection and on squeezing were apparently healthy, were on microscopical examination found to be diseased. The faucial tonsil is particularly adapted for the production of septic foci. The detection of a septic focus in a tonsil, Dr. Brown Kelly said, was a matter of great importance and sometimes of some difficulty, but the presence of caseous plugs in the crypts and enlarged cervical tonsillar glands was a valuable aid to diagnosis, although the absence of these signs did not preclude the presence of a small encapsuled abscess in the tonsil. He mentioned several points which had to be noted in advising operation in cases which suffered from systemic diseases known to be caused at times by septic tonsils: (1) if the focus was found, or if the patient was liable to attacks of tonsillitis and cervical adenitis, the tonsil should be removed and the patient told that the local condition would be cured, but that the improvement of the systemic disease could not be guaranteed; (2) if the onset of the tonsillar infection coincides with that of the systemic disease, the focus was probably in the tonsil; (3) if there were other septic foci—in the teeth, sinuses, or alimentary canal, these should be eliminated before advising tonsillectomy; (4) if the tonsil was clinically healthy, and there was no evidence pointing to a relationship between the tonsil and the systemic disease, enucleation of the tonsil should not be recommended. At the conclusion of the meeting resolutions were unanimously passed (1) that tonsillectomy by enucleation was the only effective operation; (2) that the operation should not be conducted as a minor operation, but as one of the lesser major class of operation; and (3) that the operation should only be undertaken after expert opinion had been given.

THE first social evening of the session at the Royal Society of Medicine, 1, Wimpole-street, W., will be held on Thursday, Oct. 16th, at 8.30 P.M., when Fellows and guests will be received by the new President, Sir StClair Thomson. At 9.30 P.M. Dr. W. T. Grenfell of Labrador will give a brief discourse, with lantern illustrations, on "Medicine in a Corner of the Empire."

Sir Robert Blair, who recently retired from the post of education officer to the London County Council, is one of the candidates for the chairmanship of Convocation of London University. His election would bring to Convocation a wealth of educational knowledge and experience such as few possess, and the support he gave to the medical staff in the service of the London schools is sufficient guarantee that he would serve well the interests of medical education.

# The Services.

### COLONIAL MEDICAL SERVICE.

THE following appointments have been made in the West African Medical Staff: Dr. T. A. Dowse to be a senior sanitary officer in Nigeria, in succession to Dr. W. S. Clark, promoted, and Dr. P. S. Selwyn Clarke to be a senior sanitary officer in the Gold Coast, in succession to Dr. A. C. Lorena, who is about to retire from the service.

### ROYAL ARMY MEDICAL CORPS.

Maj. K. A. C. Doig retires on retd. pay on account of ill-health.

Capt. (prov. Maj.) H. W. L. Allott reverts to the substantive rank of Capt.

### ROYAL AIR FORCE.

Flying Officer E. D. Gray is transferred to the Reserve, Class D.2.

### INDIAN MEDICAL SERVICE.

Majs. A. F. Hamilton, A. A. McNeight, A. D. White, H. C. Buckley, N. M. Wilson, J. S. O'Neill, M. R. C. MacWatters, W. H. Hamilton, and J. Cunningham to be Lt.-Cols.

Capts. S. Gordon, B. F. Eminson, A. Kennedy, and J. C. John to be Majs.

The King has approved the retirement of Lt.-Col. N. W. Mackworth.

Lt. Nilratan Chatterjee relinquishes his tempy. commn. and is permitted to retain the rank of Lt.

### DEATHS IN THE SERVICES.

Surg.-General William Richard Browne, C.I.E., I.M.S., retd., who died at Soldanelle, Rougemont, Switzerland, on Sept. 16th, at the age of 74, joined the service, in which he had a distinguished career, in 1873. After holding various positions in Southern India, and seeing service in the suppression of the Rumpa Rebellion 1879–80, he became, in 1883, resident surgeon in the Madras General Hospital and professor of pathology in the Medical College, a position which he held till 1890. In that year he was appointed professor of surgery, and later was elected a Fellow of the College. In 1901 he became the Principal of the Medical College. Subsequently Surg.-General Browne returned to army duty, and was appointed P.M.O. of the Madras district. In 1905 he was appointed surgeon to the Viceroy and retired in 1908.

### THE WEST AFRICAN MEDICAL STAFF LIST.

WE have received from the Colonial Office a copy of the West African Medical Staff List (Waterlow and Sons, Ltd., London) containing the appointments to the staff as on July 8th, 1924. The list of medical officers is given first in seniority, then by colonies, and finally an alphabetical list with their services. Officers who desire additions or corrections to be made in their records of service should communicate with the Editor of the W.A.M.S. List, Colonial Office, Downing-street, London, S.W. 1.

# Modern Technique in Treatment.

*A Series of Special Articles, contributed by invitation, on the Treatment of Medical and Surgical Conditions.*

## LXXXIX.

## THE TREATMENT OF ANXIETY STATES.

PATHOLOGICAL anxiety occurs in many conditions, but the patients here to be considered are those where anxiety is shown as the chief characteristic—often associated with obsessional symptoms or hysteria—though this cardinal symptom is frequently masked by physical symptoms. Headache, insomnia, fainting spells, heart trouble, dysmenorrhœa, asthma, dyspepsia, mucous colitis, and the like, are found in anxiety states; the influence of emotion upon bodily functions accounts for the association, and when attention is directed to the mental state these physical manifestations can often be notably influenced.

### *The Avoidance of Physical Treatment.*

Physical treatment need not be considered in this article, since it is obvious that the general health of the patient must be attended to and any gross lesions treated; but it should be made clear at the outset that the doctor does not regard any physical trouble as the primary cause of the mischief. Recovery depends largely upon the patient's own handling of the situation, and any emphasis upon physical troubles, though acceptable to the patient as a means of escape from facing the situation, is for that very reason to be avoided. The search for something that can be treated by physical means, with neglect of the mental state, leads to chronic invalidism. We have to avoid the extremes of regarding the patient as suffering from a physical disorder or, on the other hand, of telling him there is nothing wrong with him. He may often be led to accept the proposition that physical disease is absent if we follow it by the remark that though his physical health is good, yet there is obviously *something* the matter or he would not come for treatment.

The sympathetic elucidation of mental symptoms is the first step in treatment, and it will be found that whilst the nervous patient talks interminably about his aches and pains, he is reticent and elusive concerning his fears and inhibitions, and more obstinate still in concealing such causes for his trouble as he may be aware of. One cause for the reticence is that in the past doctors did not seek for these symptoms, and perhaps even, by dismissing them as trivial or imaginary, discouraged the patient from revealing them. Only when he realises that the mental symptoms are regarded as being in need of treatment will he talk about them; it is now recognised that there is no danger of producing mental symptoms by "suggestion," though many nervous patients readily accept and cling to a diagnosis of physical disease.

If we waited for patients to complain spontaneously about a fear of being in closed rooms we should regard claustrophobia as a text-book curiosity, and the ready acceptance of faintness in a close atmosphere as a physically induced phenomenon easily prevents understanding. General complaints of loss of memory, inability to concentrate, of depression or nervousness, are met by a request for examples. "What sort of thing makes you nervous?" will often bring out unsuspected fears and inhibitions, though it may be necessary to ask specifically about such trouble as fear of tube trains, of being in the dark, or of sitting alone in a restaurant. The feeling of being observed may be either little more serious than the shyness of adolescence, or a most distressing symptom, no less distressing because its irrational nature is fully realised by the patient. Obsessional symptoms, of which one of the commonest is the need to return several times to make sure that a door is fastened or that the gas is turned out, are themselves productive of anxiety and indicate a condition more deep-seated than the more simply handled pure anxiety state. Anxiety and obsessional symptoms are but meagrely described in our text-books, but those who realise that pathological anxiety arises from causes unknown to the patient and may remain floating loose—a fear of nothing in particular—or may attach itself irrationally to any conceivable object, soon learn from patients its manifold manifestations. Nervous breakdowns are often exacerbations of an anxiety state, and most of the cases of "neurasthenia"—even "traumatic neurasthenia"—are examples of pathological anxiety.

### *The Physician's Difficulties.*

The minor psychoses (and under this title are grouped hysteria and anxiety and obsessional states) are generally a reaction to current difficulties; the type of psychosis is determined by the temperament of the individual and by previous troubles, and the causes—even the current ones—are not recognised as such by the patient. The commonly ascribed causes, such as overwork and stress and worry of various kinds, can only pull the trigger—they do not load the gun. The aim of treatment is to make the patient aware of his difficulties, and according to circumstances (of which the temperament of the physician is an important one) the methods range from explanation and kindly insistence up to the full technique of psycho-analysis. In any case the more the patient is encouraged to talk out his own troubles the easier will it be for him to understand himself. The mere discussion of symptoms hitherto hidden from everybody will give some relief and help to establish that *rapport* necessary for therapy. Only when this *rapport* is established can the patient be expected to bring forth such emotional difficulties as may be present. Here the temperament of the physician becomes of importance, and it must be admitted that our own resistances play a great part in hindering the patient. For example, we have in the course of our training overcome a more or less artificial resistance against accepting as a matter of fact the discussion of the anatomical details of sex, but the mental aspect of it is still subject to the social taboo. The sensitive patient will note the slightest sign of antipathy on the part of the physician and will keep back what may be essential to the understanding of his case and himself. It is a good working rule to assume that in every anxiety case there is something kept out of consciousness and that it is kept out because it is repugnant to the patient. This suppressed material is heterogeneous, but is most commonly, for obvious reasons, connected with sex. It must be accepted as an empirical observation that the bringing of the material into full consciousness, and the necessary overcoming of resistance in the process, brings relief to the patient and lessens the amount of pathological anxiety. Hence, it is plain that the physician who possesses resistances identical with those of his patient can be of little help to him and will fail to understand what he is dealing with. If he has overcome his own resistances he soon finds that in adults a minor psychosis rarely exists when the sex life is running smoothly. He hears stories of frigid wives and impotent husbands, and discovers that when one spouse comes for treatment it is often the other partner who needs it; that unhappy marriages can induce a minor psychosis, and conversely that a minor psychosis leads to unhappiness in marriage. He recognises the perniciousness of the recommendation—still frequently given—of marriage as a cure for "nerves," for anxiety often arises from fear of sex or of sex desire, and marriage in such cases leads to disaster. He may find that the patient is faced with an insoluble problem. But even then the realisation that the anxiety has served as an escape from facing the problem may help the patient. In many cases, fortunately, relief is to be found in a discussion of

the mental attitude of the individual, a discussion in which the physician may at times advantageously adopt the Socratic method after the patient has laid down his own point of view.

*Revival of a Lost Memory.*

It is a matter of judgment how much the patient should be pressed with direct questions, but where time permits it is better to wait patiently rather than, by producing denials, make subsequent avowals difficult. An ever-recurring trouble is remorse at masturbation, past or present, and the physician must be courageous enough to recognise that the dreadful effects ascribed to it are imaginary, that the habit is so common as to be almost a typical phase in sex development, and that the greatest problem in regard to masturbation is the horror we profess towards it. If the physician is able to adopt this attitude he finds less difficulty in dealing with the associated remorse; but even then he may fail, and a slight acquaintance with psycho-therapy enables him to recognise that he is dealing with an emotion arising from some deeper complex and secondarily attached to the masturbation. This displacement of emotion is characteristic of nervous symptoms and is of practical importance in treatment. A simple technique consists in placing the patient upon a couch, making him describe and, if possible, feel the emotion concerned—the feeling associated with a specific phobia, for example—and urging him to remember any occasion in the past on which the same emotion was felt. This method was successful in the war cases, and if the practitioner only once revives a lost memory by it he gains an insight into mental processes which reading does not give him. While a full analysis may not be practicable for the practitioner, he should be able to recognise those cases in which the severity of the symptoms demands it and the age, temperament, and circumstances of the patient render it possible.

The physician's influence must be used in supporting the patient and encouraging him to carry on the duties of life. Since a minor psychosis is, from one aspect, an attempt to escape from difficulties, the patient should be encouraged to persevere in spite of his symptoms. A practical point is that if a man wakes up fit in the morning, but soon tires and becomes "washed out" before the day is over, he needs a holiday; but if he wakes depressed and unrefreshed, to improve as the day goes on and become fit by the evening, he needs treatment for his anxiety and stimulation to stick to his work. The aims of the family practitioner should be to clear up those causes of anxiety which are accessible and to gain a personal influence by properly understanding the patient. The successful treatment of anxiety states must, like all treatment, depend upon experience. There is no lack of material. The real difficulty facing the practitioner is to find time properly to investigate it.

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DUST AND DISEASE FROM THE CARDING OF WOOL.—A clause in the new Factory Bill requires that "where there is any dust or fume of an injurious or offensive character, or any substantial quantity of dust of any kind, all practical measures shall be taken to protect the workers against inhalation of the dust or fume." It is also stated that where the nature of the process permits or makes it "practicable" exhaust appliances shall be provided and maintained as near as possible to the place of origin of the dust or fume. The operatives contend that the large amount of lung disease and suffering from lung complaints is due to the excessive amount of dust in the cardroom. With a view to arrive at a satisfactory solution and agreement, Mr. E. F. May, superintendent-inspector of factories and workshops for the East Lancashire division, and representatives of the employers and operatives jointly have visited some selected mills in Oldham and Rochdale. Other mills will be inspected, and it is hoped that this joint committee will reach a satisfactory arrangement before this particular clause of the new Factory Bill is laid before the House of Commons.

# Special Articles.

## PUBLIC EDUCATION IN HEALTH.

### SIR GEORGE NEWMAN'S MEMORANDUM.

Sir George Newman has submitted to the Minister of Health a Memorandum on the subject of Public Education in Health (H.M. Stationery Office, 6*d*.), prepared some months ago, but delayed by pressure of official work. In this Memorandum the Chief Medical Officer reviews the remarkable voluntary health movement which has characterised this country for many years past, and in which Great Britain has taken the lead among the nations; but that other means and methods are now available, some of them more formal and official than in earlier days does not, he says, detract from the honourable and valuable work accomplished by the pioneers. The time seems now to have come when the responsibility of central and local authorities in this matter of public education in health should be more fully appreciated, particularly in view of the fact that national health organisation has not kept pace with advance in the science and art of preventive medicine.

The Memorandum deals successively with the personal aspect of preventive medicine, the educational work of the Ministry of Health, of the Board of Education, of local authorities, of voluntary bodies, and public health education in other countries. At the end Sir George Newman makes some general observations on the present position in England and Wales, and draws some conclusions which are thus tersely set out. First, there has been a growth of knowledge in the science and art of medicine and its application to many morbid conditions now known to be preventable; secondly, there has been a rapid development of the whole system of sanitary governance and public medical services—*and public opinion has not kept pace with these two profound changes.* Yet without an enlightened public opinion the measure and value of scientific and legislative advance is impaired. It is true that attempts have been made—all of them public-spirited, many of them gallant, and a few of them even heroic—by the voluntary service of persons or societies to meet this situation and fill the breach. On the whole these efforts have met with encouraging, and sometimes enduring, success. But such enterprise is in need of guidance and support, and is liable to some degree of misdirection. It lacks unity, tends to become chaotic, is without adequate supervision, and is, all too often, insufficiently related to the new knowledge and the expanding organisation.

*More Effectual Organisation.*

The Memorandum suggests the need for full inquiry into the educational functions of local authorities and voluntary societies with a view to their more effectual organisation.

(*a*) All local authorities are indirectly engaged in educational work inseparable from the effective discharge of their statutory duties under the Public Health Acts, and this aspect of their services is paramount. It is on the whole the most important and universal form of public education in health.

(*b*) Some local authorities, in addition, are undertaking supplementary educational work of a more direct nature, though others are, or deem themselves to be, debarred or at least restricted in this more direct sphere of education. It seems to me desirable that any ambiguity on this point, or in the law itself, should be removed as soon as possible, so that upon all local authorities there should be imposed a power or a duty of direct educational work.

(*c*) Then I think the time will have come for the Government to consider whether such educational work is of sufficient importance and value to be assisted financially by an Exchequer grant under the Ministry of Health, which would naturally take the form of a provision available to local authorities for certain approved types of educational work in hygiene.

(*d*) Lastly, these two steps in re-defining the powers under which educational work is undertaken by a local authority, and encouraging its development, will inevitably raise the question of the extent to which, and the terms on which, voluntary societies should also officially participate in the more direct form of such instruction (as distinct from the indirect educational work inherent in an efficient sanitary service). On this subject it would not be appropriate for me here to say more than that, in my opinion, it is the local authorities who must be directly responsible for undertaking educational health work, direct as well as indirect, suitable to their own district, circumstances and needs, with such supplementary special assistance as the voluntary societies concerned may find themselves able to afford.

*Supplementary Teaching.*

Among the principal direct methods for providing supplementary teaching the Memorandum suggests the following: (1) The publication of annual reports, bulletins, pamphlets, leaflets, circulars, posters, &c.; (2) the preparation of special articles for the newspaper press; (3) lectures and addresses, educational classes and conferences; (4) the construction and display of exhibitions and demonstrations; (5) the use of the cinema; (6) broadcasting. In a footnote Sir George Newman adds the following interesting hints and suggestions as to details of procedure. That the method is capable of considerable development is obvious from the extent to which it is profitably utilised in similar publications for the purposes of commercial publicity. Those responsible for drafting and publishing such documents might with advantage draw on the knowledge and experience of commercial advertisers, and have regard to the technique of printing, letterpress, and display.

*Annual reports* should be clear and simple, and supply reliable statistics as to the work done and the needs and direction of future expansion. The weekly, monthly or quarterly health bulletin or journal has been widely used in America and Canada. It should be interesting and informing, and designed to keep teachers and instructors in touch with local public health questions.

*Pamphlets and leaflets* are used for purely instructional purposes in special subjects, being given to those who definitely seek the information at clinics or elsewhere. For this purpose they are undoubtedly of great value, although their application is of necessity limited to those in whom the health conscience has already been aroused.

*Posters* should be brief, graphic, and arresting as well as accurate.

The *Newspaper Press* inserts health articles to a certain extent in this country, but much more in America. Press matter consists of (*a*) "Copy" and (*b*) Advertisements. Copy is presented in several sub-divisions each of which can, to some extent, be used for purposes of health propaganda. *Editorial comment* is written to the order of the editor and deals only with subjects of paramount or current interest. It is only very occasionally, therefore, that it would be available in any organised scheme of propaganda. The "*news*" *story* is an expression used to denote copy which informs the reader in narrative form of any recent occurrence. Matter of this description may sometimes be made to point a sanitary lesson or introduce an item of health teaching, and "interviews" may thus be a vehicle for health propaganda. The "*feature*" *story* is a periodical article on various subjects such as music, fashion, art, &c., and many of them include information on health. It is the form not infrequently adopted for health teaching in newspapers in this country, and most editors are willing to accept it if attractively written and not too technical. The correspondence columns of newspapers, sometimes with the encouragement of the editor, are often deliberately employed for arousing interest and discussion, or even controversy, on subjects about which it is desired to make people think. Health subjects have been dealt with in this manner, and it is a device that should be borne in mind by the propagandist. Many newspaper advertisements such as those of soaps, dentifrices, toilet preparations, foods, and even patent medicines are framed in a manner calculated to arouse a desire for health that would be most valuable were they always employed for advocating sound hygiene.

*Lectures, lessons, educational classes and conferences* fall naturally into two groups, those forming part of the curriculum of schools or educational institutes and those delivered to audiences specially assembled for the purpose. Both groups may afford most valuable means for imparting instruction to those who desire it. The subjects should be appropriate, well presented, and amply illustrated by charts, lantern slides, or films. Originality and initiative are generally rewarded, and exhibitions and demonstrations have proved extremely successful.

The *cinema* has exceptional potentialities as a medium for public health propaganda. Practically all lasting impressions on the human mind are absorbed most readily through the visual or auditory senses, and of these two vision plays the greater part. The strength of the impression produced will depend very largely on the extent of the interest aroused at the time. In view of the remarkable development of the art of film production in the last 20 years, it is disappointing that it has not been more fully used for purposes of popular health education, but there are many difficulties, including expense, the taste of the audience, eye-strain, methods of projection, and inflammability. In American public health circles the opinion is expressed that the results of cinema methods have not come up to expectations. In order that a health film should fulfil its object it must be capable of reaching a large number by its popular appeal and of conveying its lesson correctly. The first is the business of the film producer, the second of the health specialist. These two experts have not hitherto combined effectively, with the result that in the majority of health films at present existing either the health instruction is ludicrous in its inaccuracy, besides being completely overshadowed by the dramatic effect of the film, or else the film is so packed with highly technical instruction that it fails to make a popular appeal. The cost of producing films is high, especially if only a small number of copies are prepared.

*Broadcasting* has shown remarkable development in the past 12 months and seems likely to continue to do so. As a means of publicity it already bids fair to equal or surpass other methods. At present its use for health propaganda, in this country at any rate, has scarcely begun, but there can be no doubt that it holds out immense possibilities in this direction. Already upwards of 800,000 listening-in sets are licensed, and as each set is capable of being used by a number of listeners simultaneously, the "circulation" of broadcasting is very large. The British Broadcasting Company has to provide for the taste of its listeners quite as much as, if not more than, the newspaper for that of its readers. Like the newspaper, therefore, it accepts matter that will please and interest its patrons and it naturally will not accept "copy" that will tempt listeners to remove their head-phones.

*Sound Educational Method.*

Those who would teach large masses of people the way to health must make a careful study of method. There is a problem: it must be expressed simply, clearly, graphically, and accurately; it must be steadily and moderately driven home, so that every person feels it. There is a solution: and the way out must be demonstrated in such form that the action of the individual and the community is secured. In a word, to achieve any lasting effect sound educational methods must be followed. The publicist must be a teacher, trustworthy in fact, comprehensive in conception and understanding, able to impart the knowledge which he possesses, and capable of drawing out his pupils.

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## A REPORT ON THE EMPLOYMENT AND AFTER-CARE OF TUBERCULOUS PERSONS.

BY F. G. BUSHNELL, M.D., B.S. LOND., D.P.H.,
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THE following report was drawn up at the request of the Advisory Committee (Public Health) of the Trades Union Congress and Labour Party, the inquiry being carried out in conjunction with the West of England Branch of the Society of Medical Officers of Health. A thorough and complete system of care and after-care of tuberculous persons includes the training and employment for suitable work of selected patients who may be unable to resume their own occupation after sanatorium treatment owing to the danger of relapse; their settlement and housing; their maintenance and support of their families; their general advice and assistance; and the considerations which arise therefrom. It is felt that an end should be put to the present inhuman system of allowing persons suffering from tuberculosis to return to the conditions under

which they contracted the disease, after just enough treatment at a sanatorium or hospital to enable the patient to leave the institution. The patient relapses in most cases and infects his fellow workers.

*Mode of Inquiry.*

Information was obtained from various sources: (*a*) By questionnaires circulated to the medical superintendents of recognised sanatoriums (with attached training sections), to tuberculosis training and treatment colonies and settlements, to the branches of the Society of Medical Officers of Health, and to tuberculosis officers; (*b*) from publications of British, American, and continental authorities and committees; (*c*) from personal experience of patients at the Devon and Cornwall Training and Employment Centre and Settlement, at Papworth and Preston Colonies, at the Treloar Hospital, Alton, the Shropshire Orthopædic Hospital, the Maltings Farm Sanatorium, and elsewhere.

The replies received were without exception in favour of employment at a sanatorium with training section, afterwards at a colony or training centre, followed by agricultural or industrial occupation under medical supervision and hygienic environment—always in suitable and selected cases. In the majority of cases patients were found to improve in physical, mental, and general condition. They put on flesh, there was less cough and spit, but especially occupation helped to remove discontent, and with the prospect of becoming wage-earners patients became brighter, more reliable, and less querulous.

The replies as to the effect of employment under ordinary industrial conditions, the patients living at home, showed very variable results. There was the usual tendency to resume the old occupation, as the fullest remuneration could be earned at it. If the conditions of this were not satisfactory and if patients could not regulate their life according to their state of health, relapses were common. On the other hand, if the conditions of work were satisfactory or fairly so, and the factors producing the disease (such as bad home surroundings) were improved, the general health might be maintained. As long as the health continued fairly good, the ability to support themselves and their families resulted in a contented mind and removed the worry, which had such a depressing effect on a willing individual. Mental health and outlook usually improved with employment, although physical relapse frequently occurred, especially if the housing was bad.

*Care and After-Care.*

The replies showed that care and after-care were necessary and should be continuous; that when thoroughly carried out such care was of therapeutic value and of economic assistance to the patient and to the community; that care should be organised both (*a*) as to the character and methods of training and employment, (*b*) as to the financial assistance in such schemes, and (*c*) in the maintenance of the patient and his family by the State and the local authority with real voluntary helpers. The State should approve, define, and forward the scheme, the duty being laid upon the local authority to work it out by a combination of agencies.

The housing of patients while training should be in colonies or village settlements—i.e., after sanatorium treatment and training, and also when permanently employed, if their physical condition indicated the continued need for such a life. For those who returned to their homes and were employed under supervision in work-rooms or allotments, or under ordinary industrial conditions in the vicinity of their homes, suitable housing should be provided, controlled, supervised, or improved, if necessary, by the local authority.

My personal experience is that there are numbers of patients whose future existence depends on suitable employment under medical supervision in healthy conditions, *after* adequate treatment (with or without training) at a sanatorium, and on continuous care and after-care. No training centre, colony, or workshop should be approved or established except under medical supervision and control. Such centres should be regarded as commercial sanatoriums for sick men, not as business propositions; if run as such they will be dismal failures. Unsuitable or unregulated work undertaken, when treatment by rest or graduated exercise in a sanatorium is indicated, is a danger. There are definite medical contra-indications to work. Suitable temperament is essential to success as a trainee or colonist, and the "work-shy" civilian or ex-Service tuberculous patient is useless for employment. With a number of ex-Service pensioners for tuberculosis the award of 100 per cent. pension (whether the disease is active or not) results in disinclination towards useful work of any kind. For years these men have done no work, partly because there has been no need or call to do so; some are young, others middle-aged. The civilian has the habit and need to work, in him the inclination exists, and he makes a suitable trainee or colonist.

I have no doubt that the State and local authority, assisted by local voluntary agencies, should organise and finance complete schemes of care and after-care. It cannot safely be left to voluntary agencies, which have not as a rule the knowledge, enterprise, or money to get things done. They talk much and often do little. On the other hand, the local authority may not have the vision, and acts only under compulsory, not permissive, legislation. The right spirit must animate both State and local authority. Given initiative, together with the resources of the State, success will be sure.

*Conclusions.*

1. Adequate treatment for both pulmonary and non-pulmonary tuberculous in sanatorium or hospital must precede employment in all cases—viz., convalescent after active disease, quiescent or chronic and incurable.

2. Employment is good, both physically and mentally, if the patient is fit for work and the work is prescribed in regulated "doses" under medical supervision.

3. The constant medical supervision of a complete care and after-care organisation prevents the spread of tuberculosis and lessens the sickness-rate of the disease.

4. A complete care and after-care scheme, affording training and remunerative employment, is of economic value both to the patient and the community, and lessens the financial burden to the nation.

5. Provision should be made by the State and by the local authority for training sections or "extensions" for men, women, and children at sanatoriums and hospitals, such patients to be selected on medical grounds.

6. Provision should also be made for training and treatment centres and village settlements for temporary or permanent residents under medical supervision.

7. Industrial and agricultural training and employment should be available at such centres.

8. Workshops should be provided in such centres and for urban districts under medical supervision.

9. The State and the local authority should organise such centres, assisting financially the patient and his family to exist during incapacity, partial or complete.

10. Voluntary agencies should assist in such schemes as (5) and (8).

11. *Housing.*—Patients while training in sanatoriums or residential settlements, and after training during employment, should be housed at such centres, as long as their physical state indicates the need. Those who have returned to their homes and are employed either in municipal or approved workshops or allotments, or under ordinary industrial conditions, should receive the assistance, supervision, and control of the State and local authority in housing when their home circumstances require this.

*Recommendations.*

I submit that there is need of inquiry and action by the Government, either by a Departmental or Inter-Departmental Committee, or by inclusion in the proposed Royal Commission on the Medical and Allied Services under the National Insurance Act. Need for organisation arises because there is an incomplete and, therefore, wasteful medical tuberculosis service, defective in its principles and in its complete medical care of patients. Inquiry by Departmental Committees in 1912, 1913, and 1919 approved occupational training in sanatoriums, training colonies, and village settlements, the last for ex-Service men only. The responsibility for establishment and maintenance for these institutions was placed on the Ministry of Health and £1,250,000 was proposed to finance these developments, which did not materialise. The demand now is for an inquiry into the extent of and solution of the problem on a national basis and including the whole civilian population.

The number of patients for whom accommodation is required in training centres, or in colonies or settlements, should be ascertained, with due consideration to the fact that the numbers will always be limited under a voluntary system and subject to selection on medical and other grounds. The number of such centres, settlements, and workshops should be estimated. The capital and maintenance cost should be arrived at. Allowance should be made for the saving in Poor-law and other forms of State relief and incapacity for remunerative industrial employment owing to disablement under the present lack of system.

It is futile to place responsibility for housing and after-care on tuberculosis medical officers and on after-care committees. The bogey of expense for these measures will disappear if the problem is boldly faced on the basis of facts and knowledge of their comparative cost with those of disablement and sickness.

*Points for a Government Inquiry.*

Put briefly, there are three points which show the necessity for a Government inquiry. (1) The tuberculosis medical service as it exists is incomplete and

wasteful, and itself in need of first-aid. (2) A system that leaves the treatment of the mass of tuberculous persons at the stage where the patient returns to almost certain relapse and spread of infection to others, is unsound and even inhuman. (3) We cannot wait, as some would have us do, for general hygienic, social and economic improvements to suppress the disease but make a direct frontal attack on its infectivity.

I believe I have made out a case for inquiry, when further data can be obtained and details worked out.

## UNIVERSITY OF LONDON BY-ELECTION.

NOMINATIONS for the seat left vacant by the death of Sir Sydney Russell-Wells must be received by the returning officer before 11 A.M. on Oct. 1st. Polling takes place from Oct. 13th to 17th by voting papers sent to all graduates on the Parliamentary Register. At present three candidates are known to be standing.

Sir JOHN ROSE BRADFORD, official Conservative candidate, has been closely associated with the University and its work for over 40 years as a member of the Senate, an examiner for the University, and until recently a teacher in one of the medical schools. He was at one time secretary of the Royal Society, and he served throughout the war as consulting physician to the British Expeditionary Force in France. He stands for: (1) the maintenance of external degrees in all faculties; (2) a Senate on which graduates and teachers are fully represented: (3) freedom of the University from State control; (4) development of the full resources of the University both on its internal and external sides; (5) the maintenance of the degrees of the University at their undisputed standard; (6) the improvement of the status and responsibility of the teacher; (7) the maintenance and increase of all facilities for the progress of boys and girls from school to the University. In order to carry out these aims he regards it as essential that the Governing Body or Senate should be of a representative character and contain representatives in adequate numbers of the teachers and of the graduates. He is opposed to the conception of a nominated Senate, or to any policy that would restrict the present share of representation of graduates and teachers on the Governing Body. He is opposed to the appointment of any statutory commission, more especially if empowered to carry out recommendations that would result in giving the University a nominated as opposed to a representative Senate, or in restricting the proportionate representation of teachers and graduates. Should Mr. Trevelyan carry out his intention of appointing a departmental committee to consider and report on the development of the University, he would exert his influence to see that all aspects were fully considered. Such changes as may be needed would, he believes, affect in the main the internal side of the University. He would support and advocate means by which the University may render greater assistance than it does at present to the student who, because of want of means or other hindrance, cannot obtain teaching in London or elsewhere. The two sides of the University must, he states, be fully developed if it is to play its proper part as an Imperial and as a metropolitan university. He is not pledged to any site for the University.

DR. E. GRAHAM LITTLE is standing as a Non-Political candidate with the support of the Graduates' Association, which has consistently fought the recommendations of the Haldane Commission. Having had 18 years' experience of the administrative work of the University as member of the Senate, he considers that sufficient time has not yet been allowed for testing the quality and permanence of the Dual Constitution imposed in 1900. Left to themselves the two sides of the University could readily come to an agreed decision. If elected he means to fight for certain principles threatened by the Haldane Report—namely, (1) freedom of the University from bureaucratic control; (2) government of the University by its graduates and teachers; (3) maintenance of external degrees; (4) preserving the present relations between the secondary schools and the University; (5) free and harmonious development of both sides of the University and the continuous expansion of the field of its activities; (6) conservation of the standard of the degrees, and of the central control by the University of degree-giving examinations. As chairman of the Council for External Students he clings to the uniquely Imperial character and functions of the University as the only one whose examinations can be taken in all parts of the Empire. He will oppose any change that would lower the historic standard, not only in justice to those who have obtained the earlier degrees, but because of the damage to prestige. He would exact the fullest consultation of the faculty concerned before any action affecting that faculty is taken by the Senate. He desires to see the University continuing to provide, as it has done throughout its past, the best educational opportunities for the largest number of people.

Prof. A. F. POLLARD, who is standing as Liberal candidate, is the founder of the Institute of Historical Research, open to all graduates duly qualified, whether internal or external; and was chairman of the Board of Studies in History when it successfully recommended the Senate to establish there a special adviser to external students. The University, like all living and growing organisms, may need modification and greater elasticity to adapt itself to expanding needs and fresh responsibilities, but all schismatic proposals to separate the internal from the external side or research from teaching seem to him fraught with disaster. The latest and momentous developments of the University have been achieved by hearty coöperation between representatives of different interests. The old examining side of the University, he feels, did invaluable work in nursing the newer universities into existence before any one of them was strong enough to stand on its own feet. There will, he is sure, long continue to be growing centres of education looking to London for a means and a standard of examination, as well as individual students outside the area of any university or university college who would be debarred from a degree but for the University of London. At the same time, the ultimate aim of a university is to provide a university education, and the existence of 10 millions of people within the area of the University of London imposes upon it an enormous responsibility. It is not merely or mainly a question of examinations and degrees; it is, Prof. Pollard holds, an exploded anachronism to think that a university has only to teach the young. There are hundreds of thousands of adults capable and desirous of profiting by the information and inspiration which only a university can provide. He regards it as the prime duty of the University to keep in touch with those who have taken its degrees and to get into touch with those who have not, but who live within its sphere of influence and wish to avail themselves of its facilities.

MANCHESTER ROYAL INFIRMARY.—Post-graduate lectures will be given this year on the same lines as those given during the past few years. Till Christmas these will be given twice weekly, on Tuesdays and Fridays at 4.15 P.M. All medical men are cordially invited to attend. During the last two years four professors at the Manchester University closely connected with the teaching of medical students—viz., Profs. J. S. B. Stopford, H. S. Raper, R. B. Wild, and W. H. Bragg—have been appointed respectively honorary advisory anatomist, physiologist, pharmacologist, and physicist to the Royal Infirmary. This step has helped to bring the University and the Royal Infirmary, the two largest constituents of the medical school, more closely in touch. Three of these professors (Prof. Bragg is still in America) are joining in the Friday post-graduate lectures, which are generally more scientific in type than those given on Tuesdays. On Oct. 7th, instead of the usual lecture, Sir John Bland-Sutton will give the Lloyd Roberts lecture, and has chosen the subject of Attic Salt for Gall-stones. It has been decided in Manchester, as in London, to give only one Lloyd Roberts lecture yearly. This year it will be at the Royal Infirmary, next year at the St. Mary's Hospitals.

# Correspondence.

"Audi alteram partem."

## TUBERCULOSIS AND THE FEEDING OF COWS.

*To the Editor of* THE LANCET.

SIR,—The leading article in your issue of Sept. 20th on milk production only proves conclusively that the Milk Publicity Council is faced with a colossal piece of work, and to anyone who has interested himself in the question of milk infection with tuberculosis the position seems to be almost impossible to deal with. The whole root of the evil is that everyone is trying to treat a symptom instead of dealing with the direct cause, and until the cause is dealt with there is but very little hope that we shall ever have milk that is free from tubercle.

I have gone into the matter fairly completely and have experimented largely on the possibilities of preventing tuberculosis by hygienic methods, such as cleanliness, open air, exercise, &c., and have come to the conclusion that, good as these measures may be, they have very little influence on prevention of tuberculosis in our farm stock. I have seen tubercle amongst cattle in farm stock on farms which are run under the most hygienic conditions possible, but, nevertheless, a large number of the cows reacted to the tuberculin test. I have also visited farms where conditions have been far from perfect as regards hygiene, yet there were very few reactors. On certain farms where certified milk is being produced, I was informed that cows were constantly being discarded because they reacted and, of course, this discarding would be continuous. I found that these reacting cows were disposed of either in the local market or to another farm where certified milk was not produced. I have recently had several cows tested with a view to purchase, and not 2 per cent. but 20 per cent. failed to pass the test. There are many more tuberculous cows amongst dairy herds than one would suppose and these are not discovered until a test is carried out. We, as a profession, perhaps do not realise that one cow in a herd, say, of 100, is quite sufficient to infect the whole of the milk from the other 99 cows. The same churns, buckets, and often the same milker are used for all, and were we to slaughter all the reacting cows in Great Britain to-day the results within a few months would be just as bad. One has only to go into the question of modern day feeding of a dairy cow to realise the cause of this prevalence of tuberculosis amongst dairy cows. My experiments have been carried out chiefly on pigs, for, as we are well aware, the pig is as susceptible to bovine tubercle as is the human being. Some years ago I founded a herd of pedigree pigs and housed and bred them on the open-air system. I was constantly slaughtering animals which on post-mortem examination showed marked signs of active tuberculosis.

The percentage was often as high as 5 per cent. of animals showing pathological lesions either in the form of glandular enlargement, pulmonary tubercle or pleural effusion, or adhesions. This worried me greatly, and I considered whether it was possible to effect a cure by isolation of the dams from which those pigs had been born. I slaughtered all the mothers of any pigs that showed any signs of tuberculosis, and yet this did not cure the condition. A few years later the work on vitamins by several well-known pathologists was published, and I immediately set to work on these lines, with the result that I eliminated tuberculosis entirely from one of the largest herds of pigs, numbering well over a thousand. It is indeed a rare occurrence now to find any tubercular lesions in any of my stock. I breed some 2000 animals a year, and I have the advantage of examining some 30 carcasses a week. When one considers the natural life-history of the pig it is not indeed surprising to find tuberculosis so common amongst our farm stock. The pig normally, like the cow, will give birth to its offspring in the spring of the year, when there are trees budding, grass is growing, and where there is a good supply of vitamins in its natural foods. As the result of breeding we are now expecting our animals to give birth to their offspring at unnatural periods of the year. Furthermore, the cow was never intended by nature to supply milk for human beings, and it is indeed interesting to notice what takes place with cow and calf during the spring months. Should the calf be born about April or May, and be allowed to run with its mother in its natural state, the calf will wean itself when about 4 months old, and the cow will become "dry." She would then store up sufficient vitamin A for her general health and for her next calf. But just consider what is nowadays done. As soon as a cow has calved, may be in July or August or even in November or December, the calf is taken away from her and the cow is then milked for nine or ten months, its milk supply being stimulated by such foods as cokernut cake, palm kernel cake, cotton-seed cake, &c., none of which contain, in my opinion, any vitamin content. I carried out some experiments with these three cakes, by feeding them to pigs, giving them an adequate quantity of carbohydrate, albuminoid, oil, mineral salts, and water, yet my animals immediately began to go down hill and showed marked signs of disease, proving that none of these cakes contained the food accessories. On the other hand, when I supplied foods that were rich in the vitamins A, B, and C there was an immediate marked improvement. Just consider to-day what is the ordinary milk record over a period of 12 months of a good dairy cow; 1000 gallons is quite common, even 2000 to 3000 gallons may be produced during the lactation period, and yet this quantity is maintained chiefly by foods devoid of vitamins. Here lies the cause of the whole trouble, and I predict that unless some radical change is made in our feeding methods milk as a source of sound food for human beings, especially children, will be impossible. I have been able to trace a large amount of tuberculosis in pigs to by-products from cheese and milk factories on which they were experimentally fed. Our continental competitors, especially in Germany and Denmark, make it a criminal offence to feed to farm stock even the washings from cream separators unless they have been sterilised, and it is indeed strange that up to the present our agricultural colleges and our bio-chemists have not taken the matter up from the pathologist's point of view—namely, that the trouble is not so much due to infection and unhygienic conditions as to the lowered resistance of the dairy cow to tuberculosis as the results of unnatural feeding.—I am, Sir, yours faithfully,

M. J. ROWLANDS, M.D.

Southwood Farm, Westerham Hill, Kent,
Sept. 20th, 1924.

## FUNDAMENTAL CANCER KNOWLEDGE.

*To the Editor of* THE LANCET.

SIR,—In the leading article with this title in your issue of August 9th you show that, as a result of many years of arduous research, a foundation for the hoped-for superstructure has been laid. There is, however, a missing stone. Work on this problem was started at a period when the connexion between preventive medicine, mobile laboratories, and stationary investigation laboratories was but little recognised. Thus research was commenced and has been continued by the pathologist, aided by clinical observation and ever-increasing biochemical knowledge. In the present day, were a new disease to attract attention, concerning the nature of which various observers differed in details but were on common ground in asserting that (1) it appeared at a certain period of life, (2) was apt to be found (*a*) in users of special diets, (*b*) in successive inhabitants of certain houses, (*c*) in places haunted by rodents and

their concomitant food and parasites, (*d*) in human subjects of helminthism, (*e*) in persons following occupations involving contact with chemicals—field work probably would (and certainly should) be the first effort towards disentanglement of reputed factors.

An area where prevalence of the disease was on the increase having been selected, a house-to-house inquiry by the sanitarian, aided by experts in the various sciences dealing with life factors, as influenced by the environment of man and beast, would be conducted. This would embrace in detail the history, in reference to these factors, of both the healthy and the diseased in each house within the selected area. The toil would be great, but would be trivial compared with the 24 years' research by pathologists thus unaided in the quest of truth. The British Empire Cancer Campaign has recently set up committees for statistical and economic research into the causation of cancer. What I should like to see would be carefully recorded details (say) of a thousand households devoid of effort to support a particular theory, which would afford, on concentration, a mathematical basis on which to apportion the guilt of suspect causative agents. Such a method led Sir Ronald Ross, 25 years ago, to put aside hypothesis in malaria research and confine labour to immediate factors. An inquiry of this kind would be hopelessly handicapped in Great Britain, where the analogues of Hindu caste and the American Munroe doctrines guard the Englishman's home. But in tropical and subtropical countries there are known to be cancer-affected and, possibly, cancer-free areas where indigenous races less likely to resent intimate inquiries are to be found—as shown by the success of the Rockefeller anti-hookworm campaign. The funds now available for cancer research would not be unduly depleted by outlay on "expeditions," for pursuit of this practically untouched branch of an important subject.—I am, Sir, yours faithfully,

W. G. KING,
London, N.W., Sept. 17th, 1924. Colonel, I.M.S. (ret.).

## WANTED, A JOURNAL OF MECHANO-THERAPEUTICS.

*To the Editor of* THE LANCET.

SIR,—It is practically the rule that as soon as any particular branch of medical or surgical science comes to be regarded as a specialty, journals devoted to it commence to appear in various languages. Before long the only possible complaint is that there are too many of such publications. There is, however, one notable exception—viz., mechano-therapeutics, to which (together with its forerunner and foundation—namely, educational gymnastics) there are only four small journals exclusively devoted. These are: 1. *Svenska Gymnastiken i Utlandet* (Swedish Gymnastics Abroad), founded 1905. 2. *Tidskrift i Gymnastik* (Journal of Gymnastics), founded 1873, published respectively by the International and Swedish Societies of Graduates of the Royal Central Gymnastic Institute of Stockholm. Both these periodicals are in the Swedish language, and only the former reviews the literature systematically. 3. *Journal of the Chartered Society of Massage and Medical Gymnastics*. 4. *Maandschrift voor Heilgymnastiek*, the official publication of the Dutch Society for Medical Gymnastics and Massage. Apart from these, the only medical journals that consistently devote any space to mechano-therapeutics are the *Zeitschrift für orthopädische Chirurgie* and the *Archiv für Orthopädie*, which review the literature in so far as it is related to orthopædics, and the *Zeitschrift für die gesammte Physikalische Therapie*, which deals with physical therapeutics as a whole.

What is needed at the present day is a Journal of Mechano-Therapeutics which would publish original articles and reviews of current literature on all branches of the movement cure, such as massage proper, vibration, passive and active movements of joints, "manipulative surgery," "remedial exercises," "spondylotherapy," and all portions of educational gymnastics and physical drill that have for their object the prevention or cure of disease or which are the foundation of therapeutic movements. The appearance of such a journal would supply a long-felt want, and be welcomed by the medical men interested in these methods whose number increases year by year, and I see no reason why England should leave it to the foreigner to take the first step.—I am, Sir, yours faithfully,

EDGAR F. CYRIAX.
Welbeck-street, W., Sept. 20th, 1924.

## THE TISSUE PATHOLOGIST.

*To the Editor of* THE LANCET.

SIR,—I was keenly interested in a leading article in THE LANCET of Sept. 6th on the tissue pathologist. Last year [1] when drawing attention to the scarcity of pathologists who have a wide knowledge of morbid anatomy and histology, I briefly outlined a scheme for the formation of a National Pathological Museum which would stimulate the study of this branch of our profession and in course of time become a valuable training centre for future pathologists.

Briefly the scheme is as follows:—

1. A building in a central position, such as the Museum of the Royal College of Surgeons of England.

2. A governing body composed of, say, representatives of the various Colleges and Universities. (To include surgeons, physicians, pathologists, &c.)

3. An executive staff of medical men: (*a*) a pathologist (the head of the Institute) and possibly an assistant pathologist; (*b*) bacteriologist; (*c*) embryologist; (*d*) comparative anatomist, perhaps also a chemist and others.

4. Working staff to do section cutting, mounting, specimen and clerical work; artists and photographers should be included. This organisation and staff would be responsible for the important work of the institution itself, but there would remain the problem of relating the work of the museum to the practice of the surgeon in every part of the country. The actual practical results to be secured from it would be so immediate, the knowledge to be gained so far-reaching, that much could be accomplished towards compiling what I may term a finger-print system of malignant disease comparisons.

To ensure that such an institution would be supplied with suitable and adequate material the coöperation of practitioners and medical schools throughout the country would be required. For this purpose I would propose the appointment of agents or scouts, in connexion with the medical schools. The inducement I would present would be the offer of a certain number of scholarships to young people desirous of taking up the career of pathology. In this way two valuable purposes would be secured: (1) Students would be constantly on the watch for material obtained, as it were, at first hand with which to supply the centre. (2) They would be gaining valuable experience and the ranks of first-class morbid anatomists would be strengthened.

Yet a further advantage discloses itself. The sum of human knowledge would be considerably added to if in certain classes of tumour the after-history of patients could be carefully noted and compared. The authorities of the museum would be charged to give immediate notice of any such cases which came to their notice, and to supply forms for, and details of, the information which they required. I believe there are very few practitioners in this country who would not readily collaborate in such work; especially where, as I am perfectly assured would very quickly be the case, the national pathological museum began to give practical demonstration of its work.

The results of the work carried on by the staff of the museum would be made known to the profession through the usual channels, and, in addition, its activities might well include the publication, from time to time, of an Atlas of Pathology. Thus eventually we should secure a standard by means of which the tumours of every class could be at once recognised and properly placed, and a correct diagnosis and prognosis given.

The need which exists for the formation of such a museum, and the results which would accrue from it, require only brief statement at present. The great majority of tumours found at operation are easily placed in their right category on

[1] THE LANCET, 1923, i., 218.

examination of their microscopic structure. But there are great difficulties still to be overcome. I have myself been studying the gross and microscopic appearances of tumours for the past 40 years. Yet I often meet with a microscopic section which to my knowledge does not fall into any of the routine groups. After a period of speculation and research I am sometimes able to recognise its true nature by comparison with a similar specimen in my collection. At other times the nebulous picture of a similar specimen seen somewhere years before will not materialise and I am left in uncertainty. In the museum all the specimens would be catalogued and classified in such a manner that anyone could rapidly pick out that case which corresponded with the one under review.

The following case—one of many—is typical of the difficulties which I have observed in my own professional experience:—Tumour of forearm: (1) Report by E. H. S., "the Tumour is a lymphadenoma and is malignant"; (2) report by Dr. B., "Fibrosarcoma, possesses local malignancy not recurring after adequate removal"; (3) report of Mr. C., "Lymphangioma. No malignant transformation has occurred." The surgeon who removed the tumour was thus left to ponder the above reports, clearly at variance.

Two more outstanding advantages of a National Pathology Museum declare themselves: (1) The provision of more and better-trained pathologists (by reason of the fact that students will find knowledge ready to their hands instead of requiring years of experience to acquire); and (2) the centralising and rendering permanent of the vast stores of information and experience which pathologists up and down the country have gained and much of which will eventually die with them unless some means such as this is devised for its preservation.

The only objection raised is that of finance. Many physicians and surgeons have expressed interest in this scheme, but all point out that the proposed museum would cost a lot of money. How can this money be obtained? The medical profession cannot afford it. The State is already overburdened. We must look elsewhere and hope that some generous individual will come forward and found an institution which would fill a great need.

I am, Sir, yours faithfully,

ERNEST H. SHAW, M.R.C.P. Lond.

Royal Northern Hospital, London, N.,
Sept. 20th, 1924.

## PROVISION FOR RHEUMATIC CHILDREN IN BIRMINGHAM.

*To the Editor of* THE LANCET.

SIR,—In connexion with your leading article of August 28th on Rheumatic Affections in Children, you kindly refer to one portion of the attempt which is being made to deal with this problem in Birmingham; perhaps I may be allowed to draw attention to other work of a similar character which is being carried out by the City of Birmingham Education Committee through its Special Schools Department, which is mentioned in another portion of the annual report from which you quote. Baskerville House Residential School for Physically Defective Children has 47 beds, the majority of which are devoted to children who suffer from rheumatic affections and intractable chorea. During the past three years just over 100 children have been in residence under observation for an average period of six months. Dr. A. P. Thomson, Special Schools Medical Officer, writes:—

"The majority of the children in Baskerville have some form of rheumatic disease. Sufficient time has hardly elapsed to enable me to speak definitely of the results, but the first re-examination of children who had left the school six months or more previously was very promising; most of them had been in good health and in regular attendance at an elementary school, whereas before their admission they had either been entirely absent from school for some years or had attended only sporadically. I wish to point out that we find at Baskerville that suitably controlled educational methods are a very valuable adjunct in the treatment of rheumatic (and especially choreic) children.

"During the year I have been endeavouring to discover tests by the use of which it would be possible to be sure that a child had become safe from the danger of rheumatic relapse or the further progress of disease of the heart. . . .

"We found that as a whole the children did not do well during the winter term and we thought it possible that the absence of sunlight might be of importance in predisposing to relapse. We propose to use an ultra-violet lamp in the future during the sunless periods."

In addition to the above, an attempt is being made, in connexion with a committee of the British Medical Association, to study the geographical and seasonal distribution of rheumatic affections. The names of all children who are reported as unable to attend school on this account by private practitioners, school medical officers and school nurses, school attendance officers and health visitors, are collated and, as far as possible, investigated. In this way it is hoped that material of real value towards the elucidation of ætiology, treatment, and educational procedure will be forthcoming.

I am, Sir, yours faithfully,

G. A. AUDEN,
Sept. 20th, 1924. School Medical Officer, Birmingham.

## INCIDENCE OF GOITRE IN EGYPT.

*To the Editor of* THE LANCET.

SIR,—In the paper on the above subject which appeared in THE LANCET of Sept. 13th, the authors, Prof. R. V. Dolbey and Dr. M. Omar, of Cairo, state that they have been informed that there is no goitre in Abyssinia, and that they have seen none in the Sudan. So far as Abyssinia is concerned, the information furnished them would appear to be incorrect, as they will find on reference to an interesting paper by Dr. Charles Singer on Notes on Cases met with in South-Western Abyssinia in March, 1904, which appeared in the *Journal of Tropical Medicine* for 1905 (p. 17). In this paper Dr. Singer states that

"Cases of goitre were met with throughout our route across Abyssinia, but were much more common in the western than in the eastern part. The cases were usually of a parenchymatous type, but adenomatous and other forms were met with, and Graves's disease seemed far from rare. All the cases of goitre that I saw were in the plateau itself, and I saw none in the low country forming the valley of the Sobat and Baro rivers, which are inhabited by Negro tribes of quite different race to the Gallas and Abyssinians of the high country."

Possibly Prof. Dolbey and Dr. Omar had in mind only the low country to which Dr. Singer refers, as this is the part traversed by the Sobat and Baro, which are large and important tributaries of the White Nile. It should, however, be noted that goitre does occur, and is indeed common in the South-Western portions of Abyssinia. Whether the disease is also met with on the northern part bordering on Lake Tsana, the source of the Blue Nile, I am unable to say.

I am, Sir, yours faithfully,

ANDREW BALFOUR.

London School of Hygiene and Tropical Medicine, Sept. 22nd, 1924.

WORTHING HOSPITAL, SUSSEX.—This excellently managed hospital is one of 46 beds; the governors are hoping in the near future to bring that number up to 100. In the spring of last year a new wing was opened providing for maternity and paying patients, but still the provision is inadequate. Thanks to the balance in hand of £666 at the end of the last financial year and the receipt since Jan. 1st last of £2700 in legacies and life governors' subscriptions, the governors at their meeting decided to proceed at once with a scheme for the rebuilding of the administrative departments and the reconstruction of the heating and hot-water systems, at a cost in round figures of £5000. The difference between the sums of £2700 and £5000 is to be taken from capital as required. Land immediately to the north of the new maternity wing is to be utilised for the purposes of the new departments, and the plans have been so prepared that the new works may harmonise with the still larger developments which are in contemplation. In the present scheme the most pressing need is the reconstruction of the domestic offices; while in the past considerable difficulty has been experienced in keeping the institution warm. The first buildings of the present hospital were opened in 1881, but it was in 1829 that hospital work was begun in the town in two rooms.

# Public Health Services.

## THE OUTBREAK OF TYPHUS FEVER IN ST. HELENS.

WE are indebted to Dr. Frank Hauxwell, medical officer of health for St. Helens, for some details of the recent outbreak of typhus in that county borough. The first case was discovered on August 12th. After having been ill at home for nearly a week, a girl, aged 14, was sent to the isolation hospital from 18, Bold-street, on the evening of August 11th, by her own doctor as suffering from measles. When seen next day by a medical officer of the health department typhus was suspected, and this was later confirmed by Dr. W. Hanna, of Liverpool. This child died three days after admission. In following this case up it was found on visiting the home that the father had also been ill at home for nearly a week and was being treated for "influenza." He also proved to be suffering from typhus fever and was removed to hospital on August 13th, where he made a good recovery. In pursuing inquiries further it was found that about a month previously (July 13th) another child from the same house had been taken seriously ill and had been treated in the Providence Hospital for "pneumonia," being discharged well from that hospital on August 10th. From a consideration of the history of this case and from the result of a blood-test taken since, there is no doubt that this also was a case of typhus and, so far as is known, the first case of the present outbreak.

The infection had existed, therefore, in the town for at least a month before it came to the knowledge of the health department. The home of this family is in one of the poorer localities of the town and the bedrooms were very dirty, beds and bedding infested with vermin, as also were many cracks and crevices in the plaster. Structurally the house is not in bad sanitary condition. The sleeping accommodation consisted of two upstairs rooms; father, mother, and baby being accommodated in one bedroom, three children in the other. There were no lodgers nor, so far as could be ascertained, had there been any.

On the day following admission of the father to hospital the whole of the remainder of the family, consisting of the mother and three children—i.e., the immediate contacts—were admitted to hospital with a view to personal cleansing and disinfestation and to allow of thorough cleansing of the house. Bedding and wearing apparel were disinfected by steam. Mattresses, flock beds, and a sofa were found to be so infested with vermin that it was considered advisable to destroy them and compensate the owners. The house itself was thoroughly disinfected by spraying, and by arrangement with the owner the walls and ceilings were stripped and re-covered. Other possible contacts were kept under daily observation by a health visitor. The mother and three children were allowed to return home, having been in hospital for eight days. Dr. Hauxwell points out the difficulty there is in enforcing isolation of contacts; this can only be done by application of the local authority to two justices for a removal order, a proceeding which means delay to such an extent as to nullify its value.

The next case to occur was a child, aged 5, sister of the original case. This child was taken ill on August 28th—i.e., 15 days since the removal of the last case and seven days after discharge from hospital as a contact. She was seen on August 29th by the family doctor, who reserved his opinion; later, on the same day a medical officer of the health department diagnosed typhus and the child was removed to the isolation hospital, where she made a good recovery. On the afternoon of August 30th the mother took to bed because she "felt too weak to walk," and when visited on the next day (31st) was also diagnosed typhus and removed to hospital, where she died on Sept. 8th.

In following up the contacts of these cases a sister-in-law, living at 42, Liverpool-street, who had been in more or less close contact with the family, was found on August 31st to be suffering from the disease. She had been under observation since the commencement of the outbreak, and though visited daily said she was perfectly well, yet when detected she had a temperature of 103° F. and was a well-marked case. She was removed to hospital the same day and died there on Sept. 5th. These three cases illustrate the difficulty experienced in dealing with contacts. They had been seen daily by the health visitor, frequently also by a medical officer, and by the sanitary inspector. No indication was obtainable that they were other than well, and yet they must have been—especially in the last case—ill some days previous to discovery, and only willing afterwards to admit that this was so.

The next case to occur was in one of the contacts under observation, a lad, aged 22, living at 44, Liverpool-street. He was found in the early stage of the disease on Sept. 7th and was removed to hospital the same day. In dealing with these later cases the same procedure was adopted as in the earlier cases. The immediate contacts, so far as possible, were removed to hospital with the hope of keeping them there for at least 21 days so as to cover the incubation period. All other contacts are visited daily. Contacts not admitted to hospital are sent there for a bath and disinfection of clothing. Bedding and clothing are disinfected by steam, mattresses and articles which cannot be disinfected are destroyed and compensation paid. The houses are disinfected and the walls stripped and cleansed. Dr. Hauxwell acknowledges the ready compliance of house owners with his wishes.

Further steps being taken with a view to limiting the spread of the disease are as follows: (*a*) House-to-house visitation in the immediate vicinity by one of the sanitary inspectors; where necessary, disinfection of the house and lime-washing of walls is recommended, lime-wash and brush being supplied for the purpose; if necessary official notice to cleanse under Public Health Act, 1875, Section 46, is served; disinfection of bedding, clothing, and of persons offered wherever advisable. (*b*) Special attention regarding cleanliness to scholars attending schools in the immediate vicinity, since mild or abortive cases are apt to occur in children; inquiry regarding all absentees. (*c*) All cases of illness in the vicinity inquired into as far as possible. (*d*) Issue of leaflet and posters drawing attention to the dangers of the disease and importance of cleanliness in fighting it.

So far there have been eight cases, with four deaths. The last case occurred on Sept. 13th in a boy of 12, who had been detained as a contact at the hospital since Sept. 1st. Ten contacts are at present in hospital and 90 others are under supervision.

## SMALL-POX IN ENGLAND AND WALES DURING 1924.

UP to the end of the second week in September small-pox appeared in 91 sanitary (including port) districts, the total number of cases being approximately 2750, as compared with 1840 in the corresponding period of 1923. Derbyshire accounts for 1080 cases in 16 sanitary districts (more than one half in the borough and rural district of Chesterfield); Nottingham for 434 cases in 10 districts. 386 cases occurred in Yorkshire (mainly in Middlesbrough) and 306 in Northumberland (mainly in Ashington).

At the present time small-pox is prevalent in Middlesbrough, Chesterfield, and the urban district of Hucknall, in all of which districts the disease has continued to be present since the autumn of 1923. Other sanitary districts now mainly affected are Derby, Mansfield, the rural district of Chesterfield, and the urban districts of Mansfield Woodhouse, Ashington, Melton Mowbray, and Gainsborough. Within the last four weeks sporadic cases have occurred in 21 other sanitary districts, including the metro-

politan borough of St. Pancras and the county boroughs of Barnsley, Leeds, Leicester, Sheffield, and Oxford. On three separate occasions this year a single case of the disease has been notified from different metropolitan boroughs. There is no evidence of the presence of small-pox in London at the present time.

Although generally the type of disease continues to be mild, severe cases occur from time to time; in the Willesden urban district in June-July there were ten cases, with three deaths.

## SCHOOL MEDICAL SERVICE.

### *Cardiff.*

THE school medical officer for Cardiff, in his report for the year 1923, states that the appointment of an additional medical officer has enabled the authority to cope with the extra work entailed in the extension of the city boundaries in 1922. During the year much attention has been paid to the question of the crippled child. In 1923 there occurred at least 50 fresh cases of infantile paralysis, many of whom are not in touch with any medical organisation, and will probably become incurable cripples before they reach school age. There are in Cardiff 122 children of school age who have never attended school because of one form or another of physical defect, while a further group of 15 put in no attendances in 1923 up to the end of September, thus making a total of 137 whose education as far as public provision is concerned is entirely in abeyance. Altogether in 1923 there were 530 children medically certified as physically defective, 500 of whom require special accommodation. Dr. Ralph M. F. Picken points out that Cardiff is unique among cities in the extent of open space remaining in or near its centre, and suggests the advisability of having a central situation for all special schools, thereby minimising the difficulties of transport. The total number of elementary school-children examined was 10,740. Of the 13,881 children examined in the routine and special groups, 27 per cent. were found suffering from one or more defects, excluding uncleanliness and dental disease, requiring special treatment. Investigations not yet ready for publication are being carried out with reference to the results of operative treatment of tonsils and adenoids and to the incidence and control of enlargement of the thyroid gland.

### *Colchester.*

Dr. W. F. Corfield reports that a sight-saving class has now been opened in East Ward School. This is an important addition to Colchester's scheme of treatment. The class for stammerers is in abeyance this year owing to the few cases at present suffering from this defect. The children who already have had treatment are visited and urged to practise the methods of treatment they were taught. An additional session is now being given to dental inspection and treatment. The number of children with spinal curvature grows steadily less, and Dr. Corfield attributes this to the particular attention paid to physical training. In 1923 there were 88 children with spinal curvature under treatment either by extra physical drill supervised by a teacher at the school, or for the more severe cases by exercises under the organiser of physical training at a special class arranged for the purpose. By the end of the year 33 cases had been cured and seven had been transferred from the spinal class to their own school classes.

### *Durham.*

This report is always interesting. In spite of the shortage of staff and the amount of work done, Dr. G. C. M. McGonigle, assistant school medical officer, has made a special study of the condition of the thyroid gland in the children who came up for routine medical inspection in a particular part of the county. He found that of a total of 478 boys and girls examined 16·3 per cent. showed definite thyroid enlargement, so that in that part of the Wear Valley which lies above Witton-le-Wear, approximately 1 in 6 of all the children examined have definite enlargement of the thyroid gland. The percentage among boys and girls at the age of 5 was found to be practically equal, but at the ages of 8 and 12 there are approximately twice as many cases among girls as boys. A certain amount of thyroid enlargement is normal and common in adolescent girls, but in a goitrous district the condition is found much more frequently at this age than in a non-goitrous district. The distribution of goitre in Weardale is interesting. Dr. McGonigle found that from the head of the Wear to Wolsingham goitre is common, but below this place it is rare. As such excellent results have been got from treating this condition in its initial stages with sodium iodide the suggestion is made that preventive measures should be taken against goitre in the particular districts affected. The expense of such measures would be trifling and could easily be carried out by the school medical staff. An excellent provisional scheme such as is carried out in certain goitrous districts in Switzerland is suggested. Dr. Eustace Hill reports that an extra medical officer is required to complete the necessary code inspections, and by the appointment of an additional nurse a third school clinic which is urgently needed could be staffed.

### *Gloucestershire.*

Dr. J. Middleton Martin records substantial improvement in the cleanliness of the children, the number of children with dirty heads having been reduced from 25 to 11 per cent. in the last ten years or so. Treatment for defects is also going ahead rapidly. At present the scheme for treatment covers only about one-third of the county, but provisional proposals have been made whereby it can readily be extended to embrace the whole area. Dr. Martin urges that the cost of extending the present arrangements to cover the whole county would be approximately only double the present expense. There is one well-coördinated scheme providing for maternity and child welfare and treatment of school-children. Ten schools in the Cinderford area were closed during the year by order of the district council on account of small-pox, and one of the assistant medical officers, Dr. T. F. Blake, who was released for this purpose from ordinary school work, gave valuable help in connexion with the outbreak by discovering in the schools four missed cases of small-pox.

### *Leamington Spa.*

The number of children examined in the three code groups was 1169. Excluding dental defects and uncleanliness, only 8·7 per cent. of these children were found to have defects requiring medical treatment. There is still, unfortunately, a percentage of 57 of unvaccinated children. Twelve cases of goitre were noted, and in five instances a family history of the disease was recorded.

## INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED SEPT. 13TH, 1924.

*Notifications.*—The following cases of infectious disease were notified during the week, namely:—Small-pox, 54; scarlet fever, 1600; diphtheria, 733; enteric fever, 120; pneumonia, 443; puerperal fever, 41; cerebro-spinal fever, 9; acute poliomyelitis, 23; acute polio-encephalitis, 3; encephalitis lethargica, 43; typhus fever, 1; dysentery, 2; ophthalmia neonatorum, 123. There were no cases of cholera or plague notified during the week. The case of typhus was again from St. Helens.

*Deaths.*—In the aggregate of great towns, including London, there were 3 deaths from enteric fever, none from small-pox, 16 from scarlet fever, 22 from diphtheria, 9 from measles, 18 from influenza. In London itself the diphtheria deaths numbered 7, and the deaths from infantile diarrhœa, which had been 22, 25, and 30 in the preceding three weeks, declined to 23. Another death from typhus was registered from St. Helens.

*Chicken-pox Notifiable.*—Ashton-under-Lyne Town Council, in consequence of an outbreak of small-pox, the first for 17 years, has made chicken-pox a notifiable disease for the next six months. Three cases of small-pox have been reported and all contacts have been revaccinated.

# Obituary.

## SIDNEY HARRIS COX MARTIN, M.D., F.R.C.P., B.Sc. LOND., M.R.C.S. ENG., F.R.S.

THE sudden death on Sept. 22nd of Dr. Sidney Martin will distress all who have come into contact with him as colleague, physician, or teacher. His interests had a wide range—from biology, which gained him the degree of B.Sc. Lond. in 1878, through physiology and pathology to clinical medicine. It is small wonder that even the iconoclasts among the younger medical scientists of to-day speak respectfully of his clinical acumen, tempered and controlled by such wide general knowledge. Indeed, the willing services of Dr. Martin were often commandeered by sick colleagues, to whom his gruff optimism brought more cheer than did the suave urbanities of a polished bedside manner.

Sidney Martin was born in Jamaica in 1860, and was educated at University College, London, and in Vienna. After taking his science degree he turned to the study of medicine, qualifying M.R.C.S. Eng. in 1882, M.B., B.S. Lond. in 1883, taking the University scholarship in medicine and honours in surgery, and M.D. Lond in 1884, and becoming successively Member and Fellow of the Royal College of Physicians on London a few years later. The scientific aspect of medicine claimed him from the first, and he became pathologist, curator to the museum, and medical tutor to the Middlesex Hospital and pathologist and medical registrar to the City of London Hospital for Diseases of the Chest. The physiology and pathology of digestion intrigued Martin throughout his career, and his studies on protein metabolism in health and disease, the subject of a communication to the Section of Pathology of the B.M.A. in 1890, led him to investigate the chemical pathology of protein poisons in infective disorders. In his Goulstonian lectures, published in THE LANCET,[1] he compared the chemical pathology of diphtheria with that of anthrax, infective endocarditis, and tetanus. The main thesis of these lectures would not be disputed to-day—that knowledge of the morphology of the primary infective agent cannot explain the symptoms of disease, and that, beside the study of the causative organism and of the histological lesion, investigation of the poisonous product of the infective agent is needed. The further prosecution of his studies into the chemical products of pathogenic bacteria formed the subject of his Croonian lectures[2] in 1898, by which time Martin was both a Fellow and professor of pathology at University College, and also assistant physician to University College Hospital and to the Hospital for Consumption at Brompton. Experimental pathology was still despised by many physicians as irrelevant to medical work, but Martin was even at this time a firm defender of controlled animal experiments to supplement clinical observation of patients, which, however, he neither underrated nor neglected. In 1895 he wrote a book on Functional and Organic Disease of the Stomach, and he continued for many years to publish contributions to books (notably to Gibson's Text-book of Medicine, Quain's Dictionary of Medicine, Bain's Text-book of Practical Medicine, and Clifford Allbutt's System of Medicine), and to journals on the disorders of the digestive system. His Lettsomian lectures, delivered in 1909, were on Functional Disorders of the Stomach and Intestines, and the Lumleian lectures in 1915 on Chronic Infections of the Colon completed this long series of observations on the pathology of the digestive tract.

Meanwhile, however, Martin's critical faculties were being used in another field, in connexion with the Royal Commission appointed in 1890, and reappointed in 1894, to inquire into the effect of food derived from tuberculous animals on human health. The object of the investigation was to determine whether the meat and milk of tuberculous cows was capable of transmitting the disease, and his Appendix to the Report, issued in 1896, described with great minuteness and exactness a very detailed inquiry. A large part of the Report of the Royal Commission consisted in the evaluation of Martin's conclusions, which were adopted generally by the Commission, who regarded it as established that any person who takes tuberculous matter into the body as food incurs risk of acquiring tuberculous disease. In 1895 Martin was made a Fellow of the Royal Society, and in 1903 he published his well-known text-book on pathology. In this book he recognised that his title would cover two great groups of work, morbid histology and general pathology, but he deals only with the latter, assuming in the reader some practical familiarity with the former and with the elements of bacteriology. The work was recognised at once by all as of high excellence, giving a complete survey, at the time of its issue, of a rapidly growing subject, and familiarising the learner with the problems presented by infection and immunity as well as with the phenomena and results of inflammation. The many concise and lucid summaries formed a feature of this valuable text-book.

During the war Sidney Martin was attached to the Third London General Hospital at Wandsworth and worked strenuously, since his duties as physician and professor of clinical medicine of University College Hospital could not be neglected, and were carried on concurrently with his war work. This was not confined to a duplication of his clinical responsibilities. In March, 1916, a committee was appointed by the Royal Colleges of Physicians and Surgeons to advise the Government in relation to medical practitioners in the metropolitan district required for service in the army, including members of the staffs of the London medical schools and hospitals. Sidney Martin was one of the first representatives of the Royal College of Physicians on this committee, afterwards known as the Committee of Reference, and was made chairman of the subcommittee which dealt with appeals submitted on behalf of hospitals against the undue depletion of their staffs, as well as with the preparation of lists of those who could properly be called on for war service. This subcommittee met frequently and its labours were onerous. Martin was always at his place in the chair, and his judgment, tact, and power of rapidly seeing the essential factors in each case through the maze of detail presented rendered his services of the greatest value. He represented the Committee of Reference in the joint deliberations with the Central Medical War Committee, and took a prominent part in drafting a report of the Joint Committees on the treatment of discharged disabled soldiers, having already been largely responsible for an important report on the medical treatment of dischargeable disabled soldiers in 1916. He was one of the assessors under the Appeals Tribunal of the Local Government Board, and became chairman of the subcommittee of the Committee of Reference dealing with the proceedings of the Boards of Assessors.

Sidney Martin was privileged to serve the Royal College of Physicians throughout his career. He was a member of the Joint Committee of the Royal Colleges of Physicians and Surgeons which controlled the laboratories on the Embankment in which original research was carried on from 1900 to 1905. He was examiner in medicine on the Conjoint Board of the Royal Colleges from 1907 to 1910, a member of the Council of the Royal College of Physicians in 1910–11, a censor in 1915–16, and was selected to represent the College on the Senate of the University of London in 1919. Moreover, on the foundation of the Imperial Cancer Research Fund in 1902, Dr. Martin was appointed on its executive committee as one of the representatives of the Royal College of Physicians, and he remained a member until his death. On the retirement of Sir William Church from the chairmanship of this committee last year, Sidney Martin was appointed to succeed him, and his clear summary of the recent work carried out in the

[1] THE LANCET, 1892, i., 677, 735, 787.
[2] THE LANCET, 1898, i., 1665, 1737; ii., i., 71.

laboratories of the Fund, published in THE LANCET of July 26th, 1924, was probably his last public utterance of importance.

Sidney Martin was a sincere worker and a clear thinker. He was impatient of dullness and prolixity in colleagues or students, but had no sarcasm for the tiresome garrulous patient. He was a pioneer in a forest which is now being systematically cleared, a region where chemistry and physiology jointly throw light on disease, and his labours were directed towards the removal of just those obstructions which subsequent workers have found it necessary to attack.

# Medical News.

CHELSEA CLINICAL SOCIETY.—The annual dinner of the Society is arranged to take place at the Café Royal, Regent-street, London, on Tuesday, Oct. 21st, at 7 for 7.30 P.M.

LONDON MEDICAL SCHOOL DINNERS.—Owing to the sudden death of Dr. Sidney Martin, senior physician to University College Hospital, the dinner of the past and present students of the hospital, which was to be held at the Hotel Cecil on Oct. 3rd, has been postponed to some date to be arranged in December.—The following is a diary of the other London medical school dinners, fuller details of which appeared in our columns last week: *Wednesday, Oct. 1st*: St. Bartholomew's Hospital, in the Great Hall of the hospital; Charing Cross Hospital, in Gatti's Restaurant, Strand; St. George's Hospital, in the New Hotel Metropole; King's College Hospital, in the Connaught Rooms, Great Queen-street; London Hospital, in the Trocadero Restaurant, Shaftesbury-avenue; Middlesex Hospital, in the Hotel Cecil.—*Monday, Oct. 6th*: St. Mary's Hospital, in the Connaught Rooms, Great Queen-street.—*Friday, Oct. 24th*: St. Thomas's Hospital, in Prince's Restaurant, Piccadilly.

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.—The opening of the winter session of the School of Pharmacy, 17, Bloomsbury-square, London, W.C., will take place on Oct. 1st at 3 P.M., when the President, Mr. F. Pilkington Sargeant, will present the Pereira Medal and deliver the inaugural sessional address.

MEDICAL OFFICERS OF SCHOOLS ASSOCIATION.—A meeting will be held at 11, Chandos-street, Cavendish-square, London, W. 1, on Oct. 8th, at 5 P.M., when a discussion on the relative values of stone-milled and other flours and breads, in relation to the nutrition of the growing child, will be opened by Dr. Robert Hutchison. There will be illustrative exhibits of stone-milled flours, breads, and other wheaten foods.

PROFESSIONAL AND BUSINESS WOMEN'S HOSPITAL LEAGUE.—Miss Philippa Strachey has succeeded Miss Mildred Ransom as secretary to this League, and after Oct. 1st all communications intended for the League should be addressed to her at 35, Marsham-street, Westminster, London, S.W. 1.

THE LATE DR. DANIEL BIDDLE.—Daniel Biddle, M.R.C.S. Eng., L.S.A., who died at his residence at Kingston-on-Thames on Sept. 14th, was a man of many diverse talents. A son of the late Lieut.-Colonel Biddle, of the Madras Artillery, he was born in Gloucestershire in 1840. He received his early education at Taunton and studied medicine at Somerset County Hospital, at the London University, and at St. Thomas's Hospital, qualifying at the age of 22. After a period as house surgeon at St. Thomas's Hospital, he took up medical and surgical work at Kingston in 1868, where he remained in practice for over 46 years. Since his retirement nearly ten years ago he had been very little in the public eye, but for many years he was a prominent local figure and a member of the Kingston and District Medical Society. He was a distinguished mathematician, and for some years held the post of mathematical editor of the *Educational Times*. He was also an able and accomplished statist and a member of the Royal Statistical Society. He gave valuable asistance to the General Medical Council in the preparation of four special reports issued between the years 1885 and 1887, and it was under his supervision that the census of the medical profession in 1881 and that of 1886 were issued, reports which had their influence on the decision to extend the period of medical studentship to five years. A pioneer in the standardisation of medical fees, Dr. Biddle founded for this purpose the Thames Valley Medical Association. He took a leading part in the agitation against the dual system of notification embodied in the Infectious Diseases Act of 1889, and carried the opposition into both Houses of Parliament. He contributed a paper on the subject to the Section of State Hygiene at the International Congress of Hygiene and Demography held in London in 1891, in addition to articles to the lay and medical press. His many interests included such subjects as aeronautics, theology, genealogy, and shorthand, to all of which he made original contributions, having invented a special type of balloon as well as a new system of shorthand. For 20 years he advocated on scientific grounds the legalising of marriage with a deceased wife's sister. Dr. Biddle is survived by five daughters, his wife having predeceased him in 1904.

INTERNATIONAL DENTAL EXHIBITION.—This exhibition, under the auspices of the Incorporated Dental Society, will again be held this year at the University of London Imperial Institute, South Kensington, S.W.7, opening on Sept. 29th for one week.

DONATIONS AND BEQUESTS.—By the will of the late Mr. W. H. Revis, of Nottingham, the testator left, among other bequests, £3000 to the Nottingham General Hospital and £500 to the Fielding Palmer Cottage Hospital at Lutterworth.—The Royal Northern Hospital, Holloway, has received £1000, a share of the residue of the estate of the late Mr. Arthur Daniel Serena.—Mr. Frederick Fountain has bequeathed to the Miller General Hospital for South-East London a house known as Cedar Bank as a convalescent home and £12,000 as an endowment for its upkeep.—The executors of the late Lieut.-Colonel T. Thornycroft Vernon have given £1200 for the endowment of a bed in the male ward of the Chester Royal Infirmary.—Sir Ewen J. Maclean, professor of obstetrics and gynæcology in the Welsh National School of Medicine, has given 1000 guineas to the Royal Infirmary, Cardiff, to endow an "Agnes Maclean" bed in memory of his mother.

NATIONAL MEDICAL UNION.—This Union is making an effort to collect evidence of medical opinion throughout the country, in support of its policy, for presentation to the forthcoming Royal Commission on National Health Insurance. The essence of this policy is: (1) That a State Medical Service is necessary only for genuinely necessitous persons, otherwise defined as destitute persons or as persons temporarily or permanently unable to provide for themselves. (2) That the matter of insurance against the financial risks of sickness, of which, in principle, the Union approves, should have separate treatment. The Union proposes that this should be effected by a genuine system of insurance against doctors' bills, cost of drugs, institutional treatment, &c., and that the profession of medicine should be left absolutely free from State interference to develop on the traditional lines of private practice. The National Deposit Friendly Society and the Scottish Clerks' Association are cited as examples of the type of insurance indicated before the present Act came into force. A circular letter has been issued signed by Drs. A. Blackhall-Morison, W. Russell, and J. Howson Ray, with the request that approval of the policy should be communicated to Dr. E. H. Worth, hon. sec., National Medical Union, 11, Chandos-street, London, W. 1.

## HERBAL REMEDIES: A REMARKABLE COINCIDENCE.

MEDICAL practitioners are receiving through the post a pamphlet issued by Heath and Heather, herb specialists, of St. Albans, which contains a list of herbal remedies and notes on their adaptability to the treatment of common illnesses. "There has been a most remarkable improvement," the pamphlet states, "in the health of the nation during the last three years," and goes on to add: "It is a remarkable coincidence that for those three years Heath and Heather were in business." The coincidence is not so difficult to explain as the statement on page 86 of the pamphlet asking readers to "consider that of the children born in the homes of merry England, only two-thirds reach the age of one year, and that quite half of those who survive carry with them all their lives some physical imperfection inherited from previous generations." From this it is a small step to the deduction that, as medical knowledge presumably advances, physical deterioration also creeps on. A printed slip enclosed in the pamphlet states that owing largely to the child welfare movement the death-rate among children under one year of age was only 60 per 1000 last year, but adds that the remark on page 86 was accurate when the passage was written "some years ago." If it was accurate when written it cannot have been written since the Wars of the Roses. It is hardly a coincidence that such colossal ignorance of vital statistics should coincide with outrageous claims for the properties of herbs. Packet 25, for instance, will form a complete cure for diabetes in its early stages.

# Medical Diary.

*Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.*

## SOCIETIES.

**ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.**

**Thursday, Oct. 2nd.**

OBSTETRICS AND GYNÆCOLOGY: at 8 P.M.

*Specimens:*

Dr. H. Russell Andrews: Lipoma Ulcerating through the Vagina and causing Severe Hæmorrhage in a Girl of 19.

Dr. J. S. Fairbairn and Dr. J. Taylor: Simple Ovarian Embryoma with Spread into Contiguous Structures.

*Short Communication:*

Dr. H. Russell Andrews: An Unusual Retroperitoneal Tumour.

*Paper:*

Dr. John Marrack: The Plasma Proteins in Normal and Abnormal Pregnancy, by L. J. Coetzee.

OPENING OF MEDICAL SCHOOLS.

MONDAY, Sept. 29th, and TUESDAY, Sept. 30th.—First-year students of the Faculty of Medical Sciences, University College (University of London), will be received from 10 A.M. to 1 P.M. by the Provost, the Dean of the Faculty, and the Sub-Dean. Other than first-year students will be received on Monday, the 29th, from 2.15 to 4 P.M., and candidates for the Diploma of Public Health will be received by Prof. Kenwood at 3.15 P.M.

WEDNESDAY, Oct. 1st.—Charing Cross Hospital, prize distribution by Sir Humphry Rolleston at 3.30 P.M.—St. George's Hospital, prize distribution and inaugural address by Sir Isambard Owen at 3 P.M.—King's College Hospital, prize distribution and inaugural address by Sir David Ferrier at 2.30 P.M.—Middlesex Hospital, prize distribution by Lord Birkenhead and inaugural address by Dr. Charles Porter on Some Aspects of Preventive Medicine, at 3 P.M.

THURSDAY, Oct. 2nd.—Westminster Hospital, introductory address by Mr. H. J. Waring on the Medical Man of the Future, at 3 P.M.

## LECTURES ADDRESSES, DEMONSTRATIONS, &c.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.

MONDAY, Sept. 29th.—11 A.M., Surgical Registrar: Surgical Wards. 12 noon, Mr. Simmonds: Applied Anatomy. 2 P.M., Mr. Addison: Surgical Wards.

TUESDAY.—11 A.M., Mr. Endean: Venereal Diseases. 12 noon, Dr. Burrell: Chest Cases. 2 P.M., Mr. Sinclair: Surgical Out-patients.

WEDNESDAY, Oct. 1st.—12.15 P.M., Dr. Burnford: Medical Pathology. 2 P.M., Dr. Owen: Medical Out-patients. 2 P.M., Dr. Pernet: Skin Dept.

THURSDAY.—10 A.M., Dr. Grainger Stewart: Neurological Dept. 12 noon, Dr. Scott Pinchin: Diseases of the Heart. 2 P.M., Mr. MacDonald: Genito-Urinary Dept.

FRIDAY.—12 noon, Surgical Registrar: Surgical Pathology. 2 P.M., Dr. Burrell: Medical Out-patients. 2 P.M., Mr. Vlasto: Throat, Nose, and Ear Dept.

SATURDAY.—9.30 A.M., Dr. Burnford: Bacterial Therapy. 10 A.M., Dr. Saunders: Medical Diseases of Children. 10 A.M., Mr. Banks-Davis: Operations on Throat, Nose, and Ear.

Daily, 10 A.M. to 6 P.M., Saturdays, 10 A.M. to 1 P.M., In-patients, Out-patients, Operations, Special Departments.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE COURSE.

TUESDAY, Sept. 30th.—4.15 P.M., Mr. J. Howson Ray: Carcinoma of the Rectum, Operable and Inoperable.

FRIDAY, Oct. 3rd.—4.15 P.M., Prof. H. S. Raper: Fat Metabolism and Some of Its Disorders.

# Appointments.

HOPKINS, W. E., L.R.C.P. & S. Edin., L.R.F.P.S. Glasg., has been appointed Tuberculosis Physician for the County of Merioneth.

MCARDLE, P. T., M.B., B.Ch. R.U.I., Master of the National Maternity Hospital, Dublin.

Royal Infirmary, Sunderland: PUNSHON, G., M.B., B.S. Durh. and STROTHER, T., M.B., B.S. Durh., House Surgeons.

# Vacancies.

*For further information refer to the advertisement columns.*

*Altrincham General Hospital, Cheshire.*—H.S. £125.

*Belgrave Hospital for Children, 1, Clapham-road, S.W.*—H.P. and H.S. Each £100.

*Birmingham Education Committee.*—Ophth. S. £265.

*Burton-upon-Trent County Borough.*—Asst. M.O. £600.

*City of London Hospital for Diseases of the Heart, Victoria Park, E.*—P.

*Durham County Council, Maternity and Child Welfare.*—Asst. Welfare M.O. £600.

*Hospital for Consumption and Diseases of the Chest, Brompton, S.W.*—H.P. £50.

*Hospital for Sick Children, Great Ormond-street, W.C.*—H.S. £50. Also H.P. and Asst. Cas. O. £50.

*Johannesburg, S. African Institute for Medical Research.*—Bacteriologist.

*King's College Hospital, Denmark Hill, S.E.*—Clin. Assts., &c.

*Leamington Spa, Warneford, Leamington and South Warwickshire General Hospital.*—Res. H.S. £150.

*Manchester Royal Eye Hospital.*—Jun. H.S. £120.

*Manchester Royal Infirmary.*—Asst. Res. M.O. £200.

*Ministry of Health.*—Three M.O.'s. £600.

*Napsbury Mental Hospital, near St. Albans, Herts.*—Fourth Asst. M.O. £526 10s.

*National Hospital for Diseases of the Heart, Westmoreland-street, W.*—Phys. to Out-patients.

*Newcastle-upon-Tyne, Royal Victoria Infirmary.*—Res. M.O. £350.

*Paddington Green Children's Hospital, W.*—H.S. £150.

*Pietermaritzburg, S. Africa, Grey's Hospital.*—H.S. £400.

*Queen's Hospital for Children, Hackney-road, E.*—H.S. £100. Two H.P.'s, Cas. H.S. Each £100. Also P. in charge of Skin Dept.

*Rhondda Urban District Council.*—Asst. Sch. M.O. £600.

*Royal Chest Hospital, City-road, E.C.*—P.

*Royal Naval Medical Service.*—Surg. Lieuts. 25s. per day.

*St. Marylebone Hospital, Northumberland-street, W.*—Visiting Consultant for the Nose, Ear, and Throat Dept. £100.

*Salford and Broughton Areas.*—Dist. M.O.

*Shanghai Municipal Council, Public Health Department.*—Asst. Path. £1250.

*South Wales Sanatorium, Talgarth, Breconshire.*—First Asst. Res. M.O. £375.

*Staffordshire General Infirmary, Stafford.*—H.P. £150.

*University College Hospital, Gower-street, W.C.*—Res. M.O. £150.

*Western Ophthalmic Hospital, Marylebone-road, N.W.*—Sen. and Jun. Non-res. H.S. £150 and £100 respectively.

*Willesden General Hospital, Harlesden-road, N.W.*—H.S. £100.

# Births, Marriages, and Deaths.

## BIRTHS.

BARLEE.—On Sept. 16th, in Hull, the wife of R. J. Barlee, Surgeon-Lieutenant-Commander, R.N. (ret.), of a daughter.

BATTEN.—On Sept. 13th, at Lyndhurst-road, Hampstead, N.W., the wife of Lindsey W. Batten, M.B., M.R.C.P., of a daughter.

## MARRIAGES.

FRY—MATTHEW.—On Sept. 17th, at St. Peter's, Limpsfield, Lewis Salisbury Fry, M.B., to Margaret Mary Matthew, daughter of George Cory Matthew.

PARTRIDGE—MEDLOCK.—On Sept. 18th, at St. Stephen's, Hampstead, William Linnell Partridge, M.C., M.R.C.S. Eng., L.R.C.P. Lond., L.D.S., to Katie, only daughter of the late C. W. Medlock, Esq., and of Mrs. Medlock, of Hampstead.

TOOP—SWINDELL.—On Sept. 16th, at St. Andrew's, Muswell Hill, Howard Metherell Toop, M.R.C.S., L.R.C.P., to Eleanor Mary Rose, only daughter of the late J. J. Swindell, M.R.C.S., of North Finchley, and of Mrs. Swindell, of Muswell Hill.

WADE—FRASER-TYTLER.—On Sept. 18th, at Holy Trinity Church, Melrose, Henry Wade, C.M.G., D.S.O., M.D., F.R.S.C.E., to Marjorie, only daughter of the late James William Fraser-Tytler, of Woodhouselee, Midlothian, and of Mrs. Fraser-Tytler, senr., The Priory, Melrose.

## DEATHS.

BROWNE.—On Sept. 16th, at La Soldanelle, Rougemont, Switzerland, Surgeon-General William Richard Browne, C.I.E., M.D., I.M.S. (retd.), aged 74.

MARTIN.—On Sept. 22nd, suddenly, at Wimpole-street, W., Sidney Harris Cox Martin, M.D., F.R.S., aged 64 years.

*N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.*


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# Notes, Comments, and Abstracts.

## THE PHYSIOLOGY OF A COMMON COLD.

BY S. E. KARK, M.B., CH.B. EDIN.,

NEW SOMERSET HOSPITAL, CAPE TOWN.

SINCE the acceptance in medicine of the microbic origin of disease, a tendency has been noticeable to look to external and accidental factors, rather than to internal physiological causes, for the incidence of many maladies. That everyday disease, the "common cold," comes under the same category. Its origin has been traced on laboratory evidence to microbic infection, but that microbic invasion is not the primary cause is evident for several reasons:—

(1) A common cold does not per se produce the usual concomitants of infection—rise of temperature, quickened pulse, and the like.

(2) It is generally brought about by sudden changes of temperature—e.g., on emerging from a warm room into the cold air, discarding warm clothing habitually worn, sudden atmospheric changes frequent in spring and autumn.

(3) The onset can be produced experimentally by exposing any part of the body ordinarily protected against cold to the effects of a chilling draught.

### *Current Explanation Inadequate.*

The usual explanation, that the lowered vitality due to the chill makes the body more susceptible to infection, is hardly adequate. For the nasal chambers were not exposed to new organisms while the cold was being induced. The organisms present in the nose—saprophytic until the chill began to work—surely must require time to assume virulence. All infections have a longer or shorter incubation period, while a "cold" becomes manifest almost immediately after exposure. Other vitality-lowering agencies, such as hæmorrhages, never induce colds. I am therefore led to believe that a common cold is the result of a physiological process overdone: a normal function turned into the pathological—as a good many pathological conditions are—through Nature being stimulated to over-activity on being called upon to act precipitately in defence.

Now, the physical quality of evaporation as a temperature-lowering agent is well known. Nature, indeed, has made use of its cooling effects by incorporating it as an adjunct to the heat-regulating centre of the body, as is seen when we perspire on a hot day. In the nasal passages we have two roomy chambers, with a surface area augmented by the convolutions of the turbinates: from this large surface, normally constantly moist, it is estimated that one litre of water is evaporated every 24 hours. It is reasonable to assume that it is one of the functions of the nasal chambers thus to act as an auxiliary to the heat-regulating centre. Through these moist chambers a current of air is constantly passing. The evaporation resulting therefrom must be considerable, and as a consequence the temperature-lowering effects on the nasal mucous membrane produced by this constant evaporation must likewise be quite considerable. The cooled blood from the nasal chambers entering the general circulation must in its turn help to lower the general body temperature.

### *Emergency Heat Regulation.*

Under normal conditions the loss of heat to the body resulting from the nasal evaporation is adjusted through the heat-regulating centre, as all other bodily heat losses are, by heat production through metabolic changes. But when too sudden a demand is made on the heat-regulating mechanism, it cannot be balanced immediately by heat production. Nature, then, has recourse to another expedient, and that is, by stopping as soon as possible all the heat leakages which are generally going on in the body. As an example of this may be cited the contraction of the skin vessels on exposure to cold. Loss of heat through the nasal chambers may be eliminated in two ways:

(*a*) *By acting on the cooling medium;* turning off, so to speak, the tap of the chamber containing the cooled blood by retarding the rate of its inflow into the general circulation.

(*b*) *By acting on the cooling agent;* diminishing the air current passing through the nasal chambers.

These two actions are accomplished by the heat-regulating centre in two ways. The nasal mucous membrane has a large vaso-motor nerve-supply as well as very numerous nets of blood-vessels. By sudden vaso-motor paresis a marked stasis and congestion of the nasal mucous membrane takes place. The rate of flow of cooled blood into the general circulation is thus greatly retarded. The stasis and congestion produce at the same time a definite swelling of the erectile mucous membrane of the inferior and middle turbinates and of the anterior part of the septum. The air-way is diminished, with the result that the volume of air that can pass, the evaporation and its resulting cooling effects, are all proportionally reduced. Moisture accumulates in the chamber—the cause of the running nose—and this again helps further to diminish the volume of air passing.

In addition to this vaso-motor controlling action, respiration also plays a part in the adjustment of both the cooling agent and the cooling medium. For, on exposing the body to the effects of cold the breath is held, respiration is first temporarily inhibited, and if the exposure to the cold is continued, respiration becomes shallow. This, too, has a double effect. The volume of air passing through the nasal passages is further lessened, while the suction action of inspiration on the nasal circulation is diminished. Hence, the congestion of the nasal mucous membrane is still more favoured. The importance of this suction action is demonstrated by the ease with which a partial blockage of the nose is often overcome by a few deep inspirations.

### *Response of Defensive Nature.*

In this view a common cold is primarily a physiological process, a local response of a defensive nature to a sudden physiological demand. It is only afterwards, when congestion and stasis have been established, when warm moist air—now almost stationary—fills the nasal cavities, that microbic growth contributes its quota to the aggravation of the trouble.

Since this sudden application by the heat-regulating centre of the vaso-motor and respiratory brakes, in order to stop the heat leakages through the nasal chambers, must interfere with the normal functions of the nose, it stands to reason that Nature would make use of this method only as an emergency measure: under certain contingencies which would arise for instance:—

(*a*) When the heat-regulating centre itself is faulty. This is the case in very young children whose mechanism, compared with that of an adult, functions imperfectly. For, while an adult's temperature generally remains constant irrespective of the temperature by which he is surrounded, that of a child fluctuates to some degree in accordance with the variations in temperature of the bodies with which it comes in contact. This imperfect working of the heat-regulating mechanism in the child accounts for the susceptibility of children to catarrh of the upper air-passages.

(*b*) When the auxiliaries to the heat-regulating centre do not act well—e.g., when the skin through too much protection of warm clothing has not been allowed to react quickly to sudden changes in temperature. Thus people who are apt to coddle catch cold easily, while soldiers and those who lead an open life do not.

(*c*) When the heat-regulating centre has to act precipitately, as on sudden exposure to a draught, or during sudden temperature changes as in spring and autumn.

### *Prophylaxis.*

The better the heat-regulating centre is functioning, and the more responsive are its auxiliaries—the skin and vaso-motor nerves—the less occasion would arise under sudden strain for panicky action and its product, the "common cold." It would therefore seem that the prevention of the onset of common colds can best be achieved by training and developing the auxiliaries of the heat-regulating centre to respond quickly to altered temperature conditions. Children ought to be hardened from infancy, cold sponging should follow the daily tepid bath, older children should have a cold shower. Children should not be overburdened with too much clothing. Finally, breathing exercises relieve and overcome nasal congestion, the suction action of deep inspiration improving the circulation and the tone of the nasal mucous membrane.

## MENTAL HOSPITALS IN THE EAST.

THE recently published "Triennial Reports for the Mental Hospitals of Assam, Burma, and the Punjab," covering the period 1921–23, reveal closely similar conditions in lunacy administration in these three States. The most important change is a slow but steady increase in the numbers of certified insane. Whether this be due to the more efficient detection of mental disease, or actually to a general increase in the prevalence of insanity, is not suggested. Since the population of mental hospitals is apparently increasing all over the world, it is of the greatest interest to ascertain whether this indicates an increased ratio of sane to insane among the general population, and if so, upon what factors this change depends. In reports from such distant parts of the world as these, whose conditions it is impossible to

visualise for anyone who has not been there, any information, even amounting only to a mere opinion, on this question of universal concern would be of peculiar value.

In consequence of these growing admissions, the mental hospitals of Bengal and Assam have been overcrowded. In the latter place new buildings are projected, a serious feature of the accommodation shortage being that criminal lunatics are being detained for long periods in jail; in Burma a new hospital is actually in progress of erection. In the Punjab a new criminal asylum has been built, and the tuberculous section of the Lahore asylum has been extended. The complete segregation of tuberculous subjects in this asylum is an example which might well be followed in many English institutions: recently the treatment of these patients has included sodium morrhuate injections carried out on a large scale. Lahore is also peculiar in that the female section is entirely staffed by Franciscan nuns. This introduces another point on which a stranger to India might well desire some explanation, and that is the fact that in all these hospitals there are about five times as many males as females. There is general complaint of inadequate information as to past histories, and diagnosis in the absence of any information as to the patient's antecedents is often difficult. The majority are admitted in a poor state of physical health, due most commonly to dysentery or some other form of infective diarrhœa, to tuberculosis, or *Cannabis indica*. Malaria appears to have its highest incidence in Assam, and ascaris infection is prominent in Burma. There has been a general improvement in administration. Attendants are better paid, and consequently of a more trustworthy type. Patients are better fed, and are allowed much more liberty: a large proportion are employed, both on work for the benefit of the institution, and on large-scale manufacture which brings considerable profits. In one of these reports it is mentioned that patients are paid for their work, this money enabling them to buy such things as sweets and tobacco from the asylum bazaar.

Difficult as it is to picture the conditions under which these patients live and are treated, such impressions as can be gained from these reports are particularly encouraging, and certainly reflect favourably on the Indian administration.

## PUBLIC HEALTH IN TOGOLAND.

IN the report for the year 1923 on the British sphere of the mandated territory of Togoland it is explained that this was a German colony until August, 1914, when it was surrendered to the combined British and French forces. The territory lies between the Gold Coast and the French colony of Dahomey; its area is approximately 33,000 square miles, with a population estimated to be 1,000,000. A provisional agreement was made partitioning the colony into the British sphere and the French sphere; and the portion of Togoland now mandated to Great Britain is being administered as an integral part of the Gold Coast and its dependencies. In the portion of the report devoted to medical matters, it is stated that the most important disease in the southern area is venereal. It is not an exaggerated statement that one in every five of the population is infected. Out of 1498 patients attending the hospital at Ho during the year this disease accounted for no less than 300. One of the German methods in combating the disease was the recognition of licensed houses in the main centres, where the inhabitants of brothels were compelled to report themselves to the medical officers for examination once a week. This system, however, is repugnant to British ideas and would not be tolerated. The Government fully realise the importance of the matter, and medical officers always advise the natives to report themselves without delay for treatment when suffering in the first stage of the disease. In the northern area venereal disease is practically negligible. The medical officer at Ho writes: "Malaria and helminthiasis are next in importance and are very common, as should be expected. Sleeping sickness has not yet been met with, but leprosy is prevalent, and, I believe, is more common than is generally known. The health of the people, on the whole, is not too bad. If they would only come for treatment at once, instead of giving the medicine man a trial, one would be able to get more satisfactory reports. It is a regrettable fact that we get a very low percentage of our patients in the first stage of their disease. Even then they take their native concoctions as well as European treatment. Satisfactory progress is made in eradicating the disease of yaws, but even in this case, when all the physical signs have disappeared, they consider themselves recovered and the patients are seen no more. In yaws the effect of even a single injection of salvarsan is very spectacular, and the patient is fully recovered according to his own ideas, and in most cases he is. This, however, makes the native believe that salvarsan is a remedy for all ills; and in cases, for example, of syphilis he will not persist in the treatment for the full course. However, we persevere in the work, in the hope that with time the native will get sufficiently developed mentally to appreciate the fact that he cannot recover from all ills by the same treatment and in the same space of time." The report adds that there is a segregation colony for lepers, where the patients are housed and treated. This segregation is enforced in the town of Yendi, but residence of lepers from outlying districts is voluntary. The number resident is 21. The treatment of yaws with N.A.B. has practically freed the town of Yendi of the disease, but in spite of active measures still employed it is very prevalent in the outlying district. Malaria is epidemic and universal, and people of all ages are affected with guinea-worms. Yaws and guinea-worms are not only disabling while the diseases are active, but cause great deformity afterwards. Though the stegomyia and tsetse-fly are common in the district, no cases of yellow fever or sleeping sickness have been diagnosed. Pneumonia and bacillary dysentery are the chief causes of death. The birth-rate is reported to be approximately 80 to 100 per 1000. Infant mortality is very high. The wife of the officer in charge of the junior trade school at Yendi is an acting medical officer; she advises the chiefs of the various towns and villages regarding sanitary improvements and helps to combat endemic diseases. A number of women emigrate to the coast towns and other big centres for the purpose of prostitution, a profession which appears, in their opinion, to involve no degradation, with the result that they return to this territory infected and spread the venereal disease. The principal causes of prostitution are: (*a*) the desire of the women to amass affluence in order to purchase finery; (*b*) in many cases discontent with the status of wedlock among the labouring classes; (*c*) the lack of specific grounds for divorce, the mere inclination of one of the parties to discontinue the union being sufficient to warrant it being dissolved; and (*d*) the system of native legal marriage by which a girl is betrothed at birth, and consequently, in many cases, on arriving at the age of puberty refuses to accept the espoused husband arranged for her and cohabits with a paramour.

## SOFT WATER IN THE LONDON AREA.

A CORRESPONDENT asks for advice in finding a residential locality nearer London than the Wey Valley with an equally soft water-supply. This will not be easy, for Wey Valley water has a total hardness of only 2·8–3°. Woburn Sands with 2·8° has an equally soft water, while at Aylesbury and in parts of Dorking the hardness varies from 4·2–5°. The East Surrey Water Company, which softens its supply to about 4·5°, serves Caterham, Warlingham, and Sanderstead, as well as parts of Reigate, Coulsdon, Epsom, and Woldingham. Further information can be obtained from the very complete Return as to Water Undertakings in England and Wales, issued by the Local Government Board in 1915 (H.M. Stationery Office, 5*s*. 1*d*.). Small water-softening plants, specially designed for private houses, which will soften most supplies down to 3° or less, are obtainable from the United Water Softeners, Imperial House, Kingsway (Permutit process). The original hardness of the water and consequently the locality would then be immaterial to the user.

## MIRROR WRITING IN AN ADULT.

*To the Editor of* THE LANCET.

SIR,—Sixteen years ago you published for me a letter describing the mirror writing of a small boy. I have now met with a still more remarkable case of the same condition in a young lady doctor who is left-handed, and whose heredity is markedly so. She has from childhood written thus, and still writes as fluently backwards or forwards at will. This is the first case that I have met in which the mirror writing power has been retained to adult life, but from inquiry I have found that it is not very uncommon in childhood.

I am, Sir, yours faithfully,

VAUGHAN PENDRED, M.D., F.R.C.S. Eng.

East Sheen, Sept. 20th, 1924.

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Messrs. H. K. Lewis and Co.'s monthly list of new books and new editions, added to their medical and scientific circulating library during August, contains the names of 24 books in the medical list and 14 in the scientific and technical list, in each case covering a wide range of subject.

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## THE LANCET OF FEB. 2ND, 1924.

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